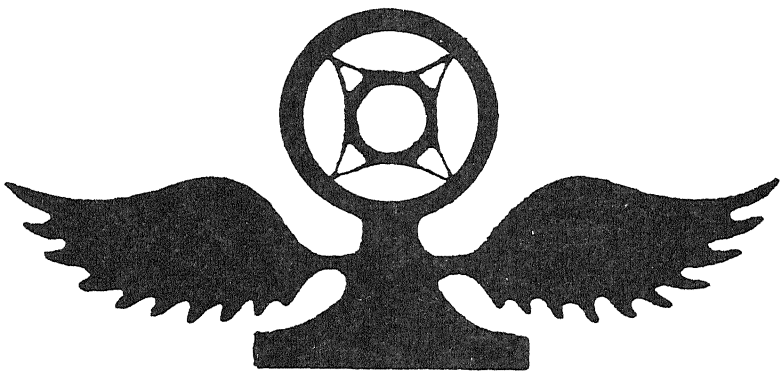
INDOCTRINATION WORKBOOK
FOR
AIR CONTROLMAN SCHOOL
CLASS A1



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PREPARED BY

NAVAL AIR TECHNICAL TRAINING CENTER
NAVAL AIR STATION MEMPHIS
MILLINGTON, TENNESSEE

PREPARED FOR

CHIEF OF NAVAL TECHNICAL TRAINING

OCTOBER 1984

FOREWORD

This workbook is an indoctrination into the Naval Air Traffic Control training program.

You will learn the various aspects of the air traffic service, its equipment, terminology, and the methods employed by controllers. This indoctrination is designed to present a broad picture of air traffic control and does not attempt to teach all the facets of the subjects discussed. Specific areas mentioned will be taught in detail when it is necessary for you to have a detailed knowledge of them.

Upon completion of this booklet, an examination will be administered by an instructor. This examination is designed to give you a better insight into the areas which may prove to be more difficult later as you progress into the more difficult specific knowledge areas, and which you may wish to review.

Throughout this workbook, portions of pages have been left blank for your personal notetaking.

A LOOK AT AIR TRAFFIC CONTROL

The impact of the industrial revolution in the nineteenth century so changed our economic structure that professional specialization has become essential in our complex and continually changing society. The members of most professions must achieve a knowledge of technical skill and adhere to regulated standards in order to perform the duties of their chosen vocations. The Air Traffic Controller is no exception. Air Traffic Control is an occupation which had its origin scarcely 50 years ago in the wake of budding commercial aviation. During the years following World War II, aviation was regarded by many as a lark, something reserved for daredevils and fools. Foolish as it may have seemed, more and more aviation enthusiasts began to take to the sky. No longer satisfied with remaining within a few miles of the local landing field, pilots began to venture farther and farther away, participating in what is known as a "cross-country flight". However, to fly cross-country, especially during poor weather conditions, or at night, some means of navigational guidance was needed. The U.S. Post Office saw this need while flying transcontinental mail flights in 1921.

NAVIGATIONAL AIDS (NAVAIDS)

The Post Office began experiments with a NAVAID called a radio direction finder. By using a cockpit instrument, this aid allowed the pilot to "home-in-on" or "fly toward" a device located on the ground. Modern versions are called "radio beacons" and are still in use today. In the 1920's, only a few of these aids were installed and the navigational system remained inadequate. As a result, some interesting methods of navigation were devised for cross-country flying. Pilots flying mail at night followed successive bonfires built by obliging farmers along the route of flight. Another device was the airways beacon. It consisted of a rotating beacon light placed on tall structures along commonly used air routes. The obvious disadvantage to both the fires and the beacons was that both required visual sighting by the pilot.

In areas of bad weather, the two aids listed above were of little use. An all weather system was needed. A system through which the pilot could relay on radio signals received in the cockpit. From this need was born the low frequency radio range. By identifying a radio range signal, a pilot could tell which course of the radio range he was on.

During the mid 1920's, the government began to establish "civil airways" or highways in the sky. At last pilots were able to fly cross-country day or night, in good or bad weather. Range stations have since given way to modern navigational aids such as the VOR and TACAN. These aids will be discussed in later chapters.

AIRPORT TRAFFIC CONTROL

As aircraft and NAVAIDS improved, air traffic increased to the pilot that a definite collision hazard existed at major terminals. In 1930, local airport operators began to establish regulations and issue radio advisories to aircraft. In 1941, these duties became the responsibility of the Civil Aeronautics (CAA), forerunner of the FAA.

EN ROUTE CONTROL

In 1935, a frightening situation came to light. Air transportation was reaching the threshold of self-destruction. Aircraft flying on instruments produced traffic congestion on the airways. No one had ever dreamed of such a thing. The first form of control was established in 1935 by an airline company which made an effort to separate its aircraft by advising them of other known air traffic. Shortly afterwards, several other airlines decided to establish a consolidated office to handle airways traffic information. This in effect became the first Air Route Traffic Control Center. Today there are 25 Centers in operation across the United States.

FLIGHT SERVICE STATIONS

Control towers and Air Route Traffic Control Centers comprise two of the three options in the Air Traffic Service today. The third is the Flight Service Station. Stations originated in the 1920's and were staffed by men who tended the airway's beacons and range stations and in many cases, seeing that the airport itself was in useable condition.

Today there are over 340 Flight Service Stations in operation. The specialists in these facilities provide preflight and inflight weather and NAVAID status briefings, and process flight movement messages. In general, stations provide pilots information and assistance, in cases of emergency, which aid them in the completion of safe flight.

RESPONSIBILITY

As an Air Controlman you are primarily concerned with the movement of air traffic. Air traffic controllers have a serious obligation regarding the use of airspace. Airspace is a natural resource which cannot be enlarged, and it will be your responsibility to utilize this airspace to the best advantage. Viewed in this light, you can see the demands of this responsibility. As air traffic continues to increase, more and more facilities will be commissioned. Thousands of military and civilian controllers are being trained to work in these facilities. Probably the most dramatic improvement being made is the implementation of computers. In the future, the automated air traffic system will increase controller productivity by reducing coordination and workload.

LOOKING AHEAD

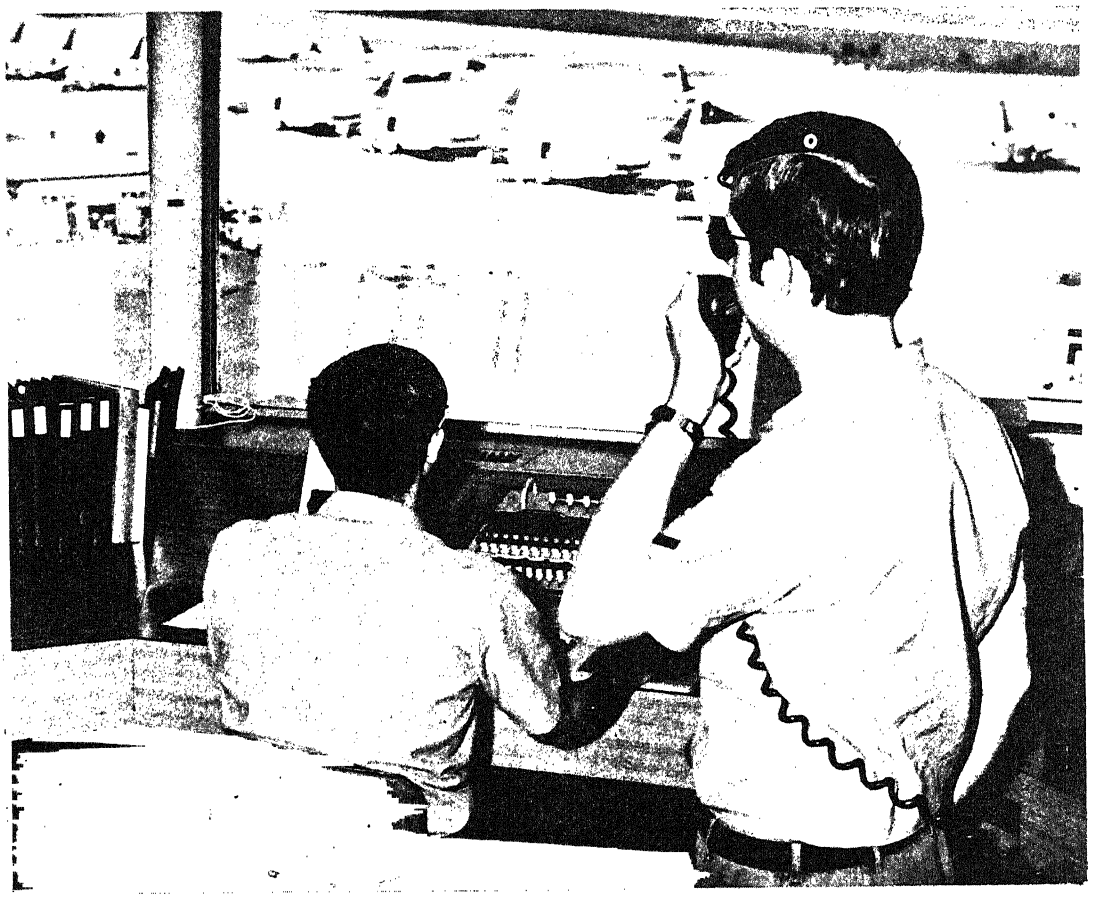
To this point, you have had a brief look at the development of aviation and air traffic control. Future chapters and lessons will deal more closely with your responsibilities and obligations as an AIR TRAFFIC CONTROLLER. A closer look will be taken at the three Air Traffic options; what they do and how they work together; what tools of the trade are used, and how all of this will affect you in your chosen position as an AIR TRAFFIC CONTROLLER.

The following pages show the typical working quarters of each air traffic option and describe the primary duties performed by the Air Traffic Controllers.

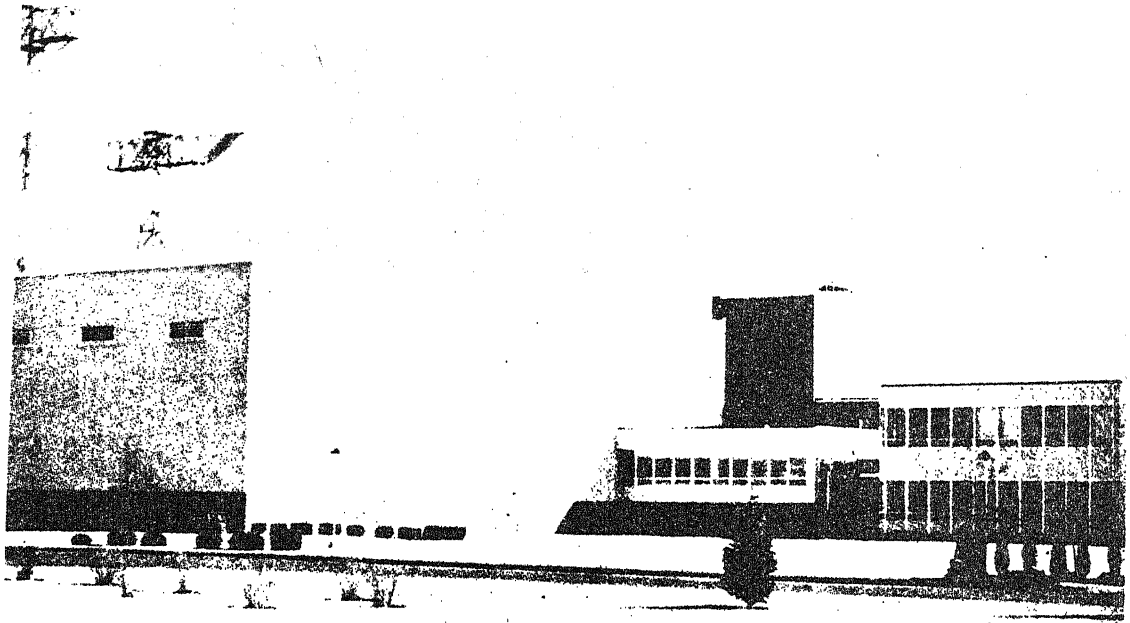
The structures that house each of the Air Traffic Facilities are unique in appearance.

CONTROL TOWER

Interior view of a tower.

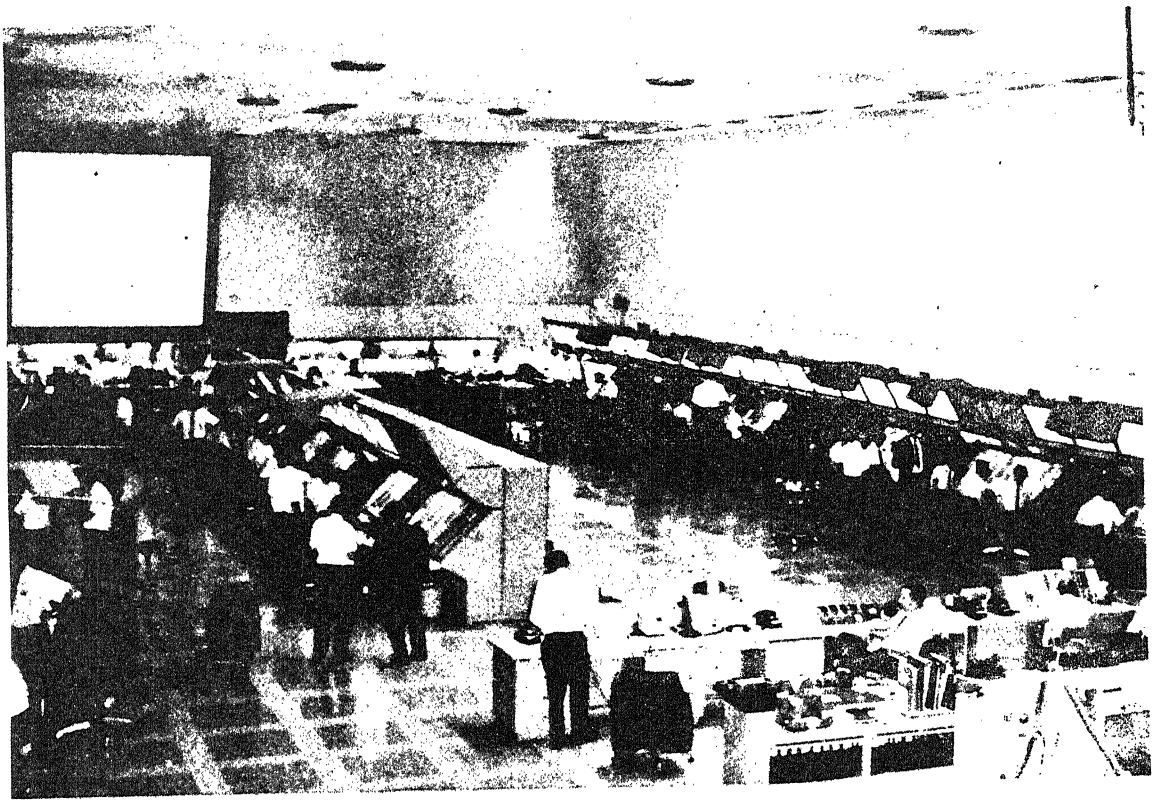


The terminal specialist controls air and ground traffic on and around an airport.



AIR ROUTE TRAFFIC CONTROL CENTER

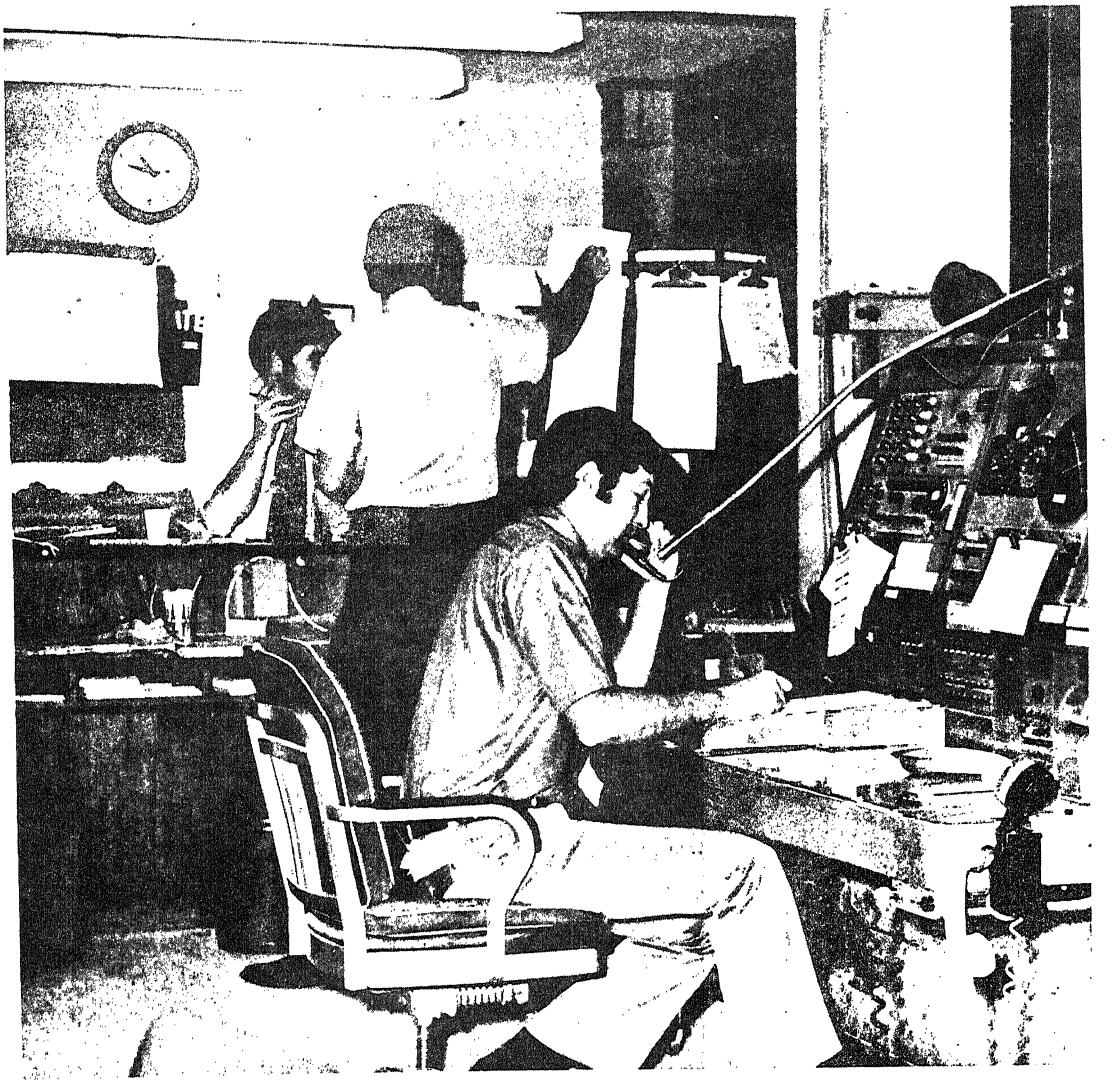
Interior view of an Air Route Traffic Control Center.



The center controller separates air traffic between airports when this service has been requested by the pilot.

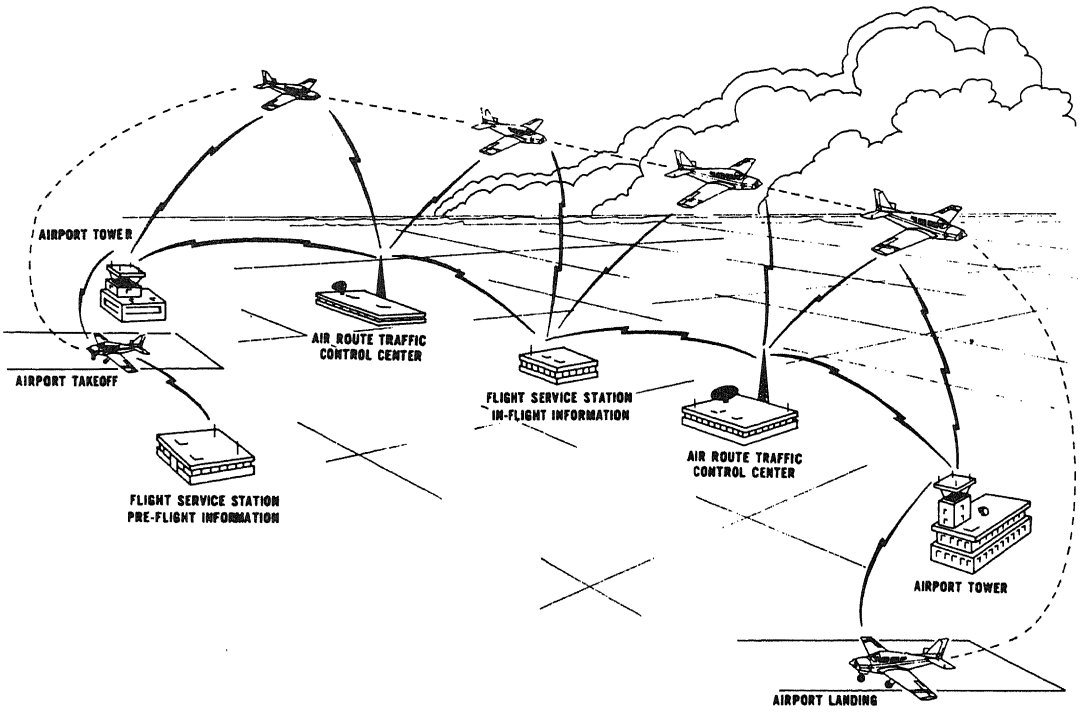
FLIGHT SERVICE STATION

Interior view of a Flight Service Station.



The station specialist has the most in-person contact with the pilot and provides him with information about weather, air navigation, and airport conditions before and during flight.

Illustrated below is an example of a pilot using the air traffic system.



AIR TRAFFIC SYSTEM

DIRECTIONS

Use this booklet as a workbook and write your responses to the questions in the space provided. The format is explained below.

Information and/or problems are presented in a sequence called frames and each frame is contained within a set of solid lines.

Information and/or problems are presented in this space and are frequently supported by pictures or illustrations.

A question is usually asked about the information and requires that you respond to the information or problem.

There is a space below each question for you to write your answer.

It may look like this:

_____ A.

_____ B.

or this:

_____

_____

or it may be blank.

A broken line indicates that the correct response is printed below the line. A perforated cardboard is located at the front of this workbook. Remove this and use it as a mask. You should place the mask on the broken line completely covering the answer until you have written your response. After you have written your response, slide the mask down and look below the broken line to compare your response with the answer. If your response is incorrect, review the pertinent frames and correct your response. Then continue to the next set of solid lines.

The correct response appears below this broken line.

EXAMPLE

In the above illustration, what two methods are being used by the tower to communicate with aircraft?

Radio and light signals.

SECTION 1

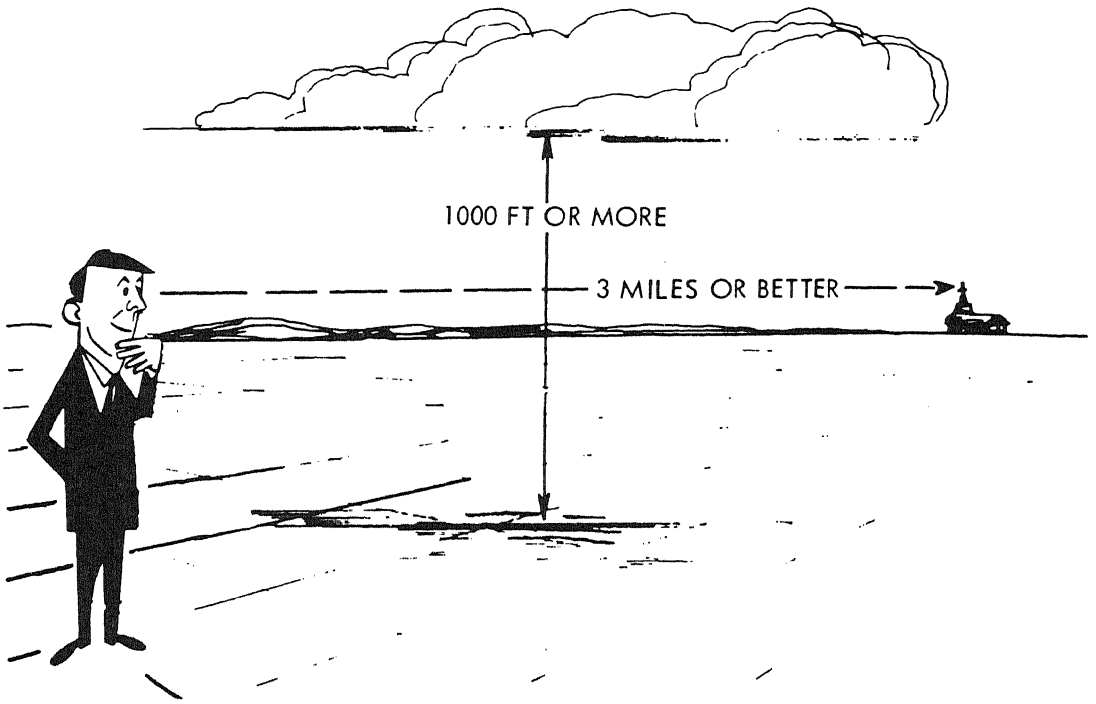
VFR AND IFR

1

Let us now discuss the responsibilities of the pilot as he uses the National Airspace System. Just as motorists must conform to certain regulations while driving-pilots conform to rules of flight established by the FAA. As a motorist you are somewhat affected by changing weather conditions but to a much lesser degree than the pilot. As weather conditions change, the rules of flight affecting pilots also change. To learn more about these rules turn to page 2 and begin with frame #2.

Pilots may operate under two different sets of flight rules depending upon the weather. The first is called Visual Flight Rules (VFR) and is generally associated with good weather.

To fly VFR in a Control Zone, the pilot must have at least 3 miles visibility and cannot fly under clouds that are less than 1000 fee above the surface. See illustration below.



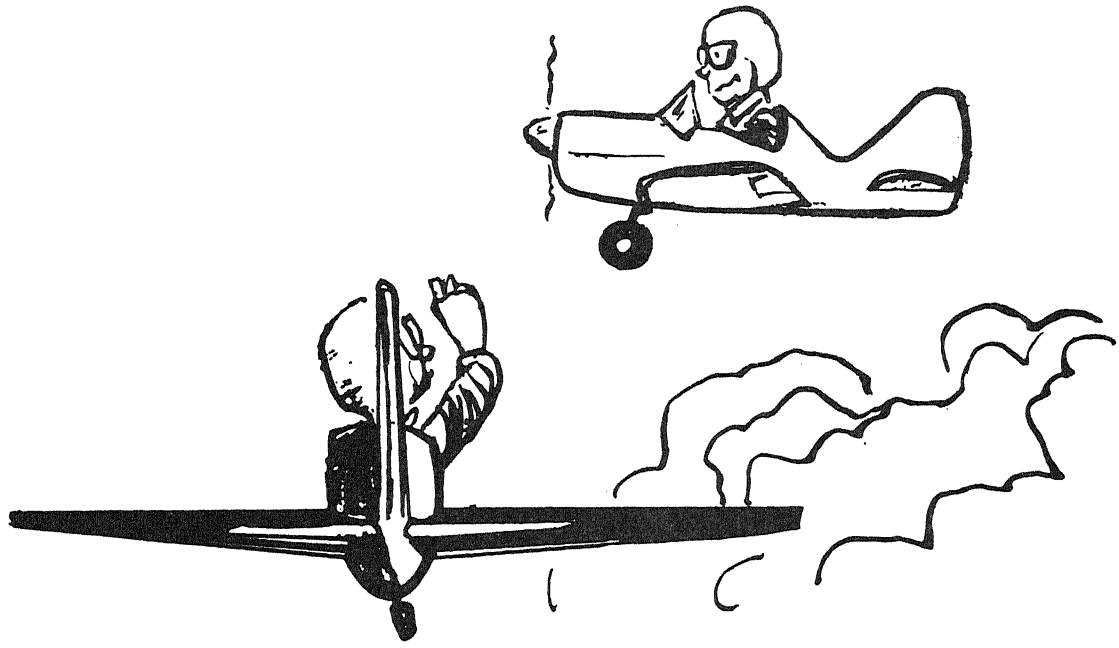
VFR MINIMUMS

What minimum height above the ground must the clouds be for a pilot to fly VFR in a Control Zone?

.....

1000 feet

VFR requires that a pilot be able to see and be seen by other aircraft. This see and be seen rule requires 3 miles visibility for aircraft operating on or in the vicinity of a controlled airport.



What is one requirement of VFR as shown in the illustration above?

.....

Pilots should be able to see other aircraft and be seen.

4

What is the contraction for Visual Flight Rules?

.....

VFR

5

When the weather is such that the pilot cannot fly VFR, he must follow the second rule, Instrument Flight Rules (IFR), however, the pilot must have received special training that quaifies him to fly in poor weather conditions.

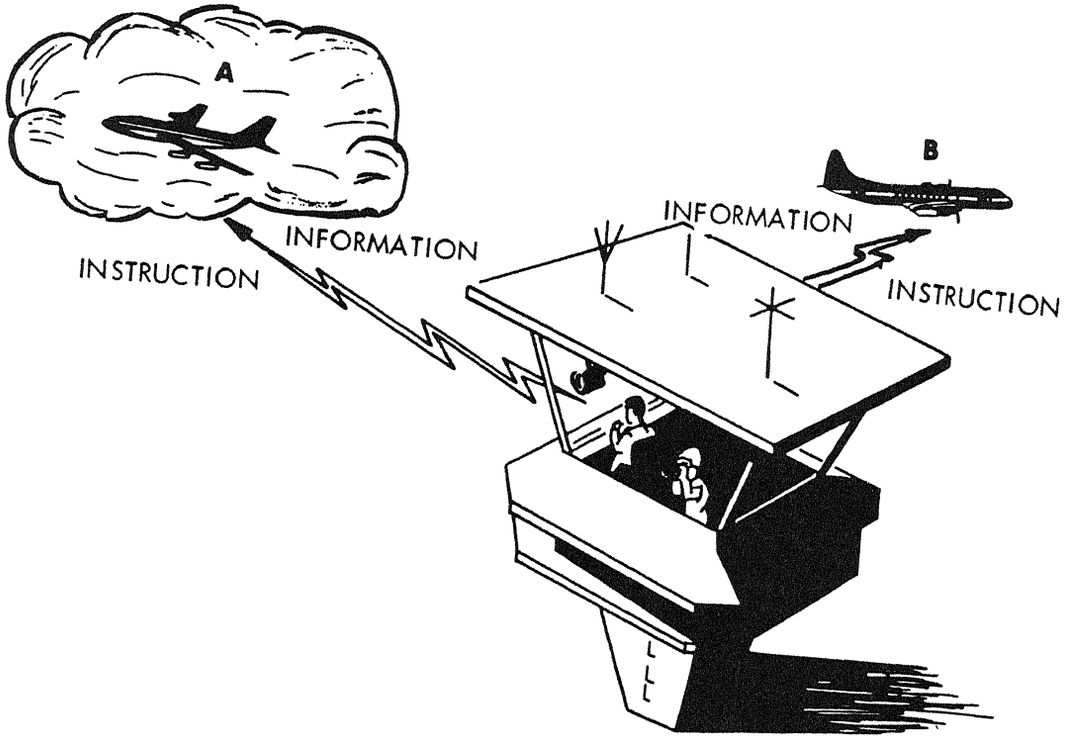
The illustration above shows an aircraft flying IFR in a rain shower. He is flying IFR because the visibility is less than how many miles?

_____

3

6

When a pilot is flying in an area with less than 3 miles visibility he must fly in accordance with IFR.



Identify the flight rules by which the aircraft are operating in the above illustration.

..... Aircraft A

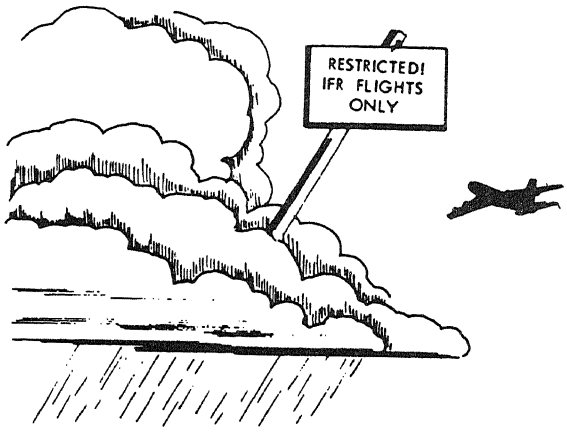
..... Aircraft B

IFR Aircraft A

VFR Aircraft B

7

Instrument Flight Rules (IFR) allow a pilot to operate his aircraf in clouds and in reduced visibility conditions.

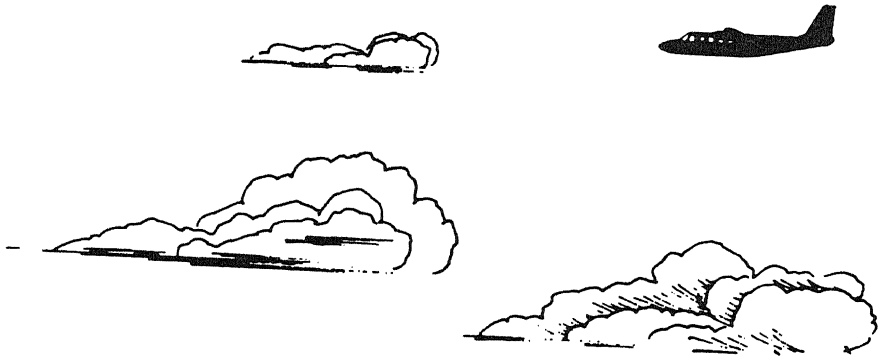


What rules must be followed if the pilot desires to operate in the clouds shown above?

.....

IFR

8

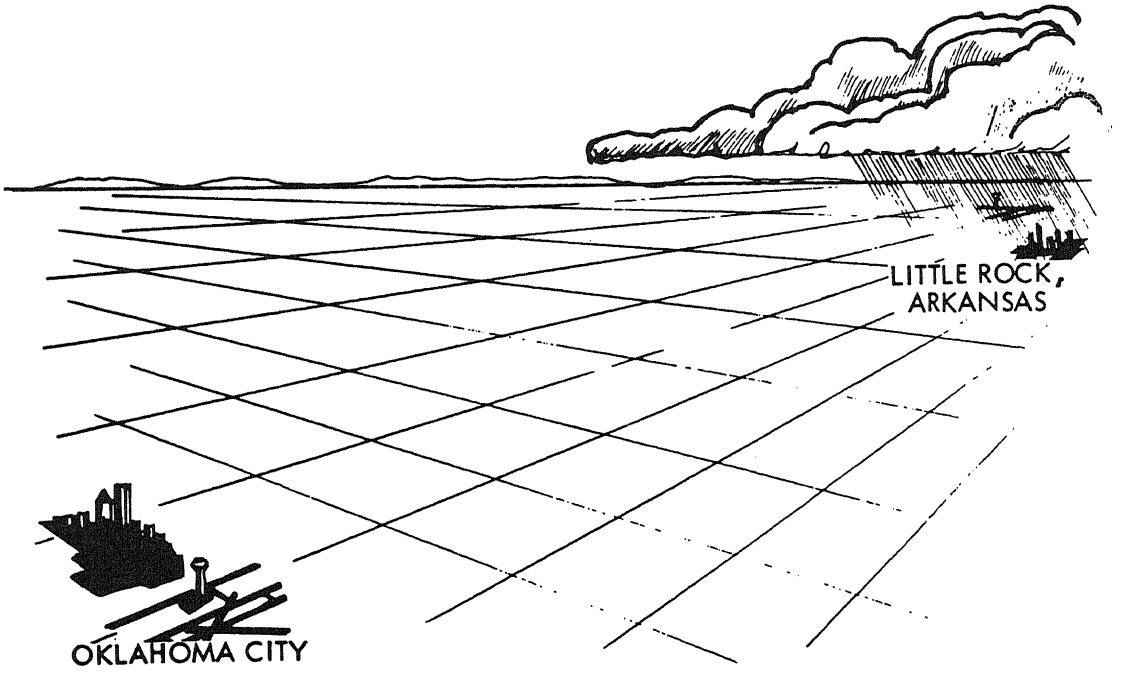


In the above illustration is the aircraft VFR or IFR?

.....

VFR

9



A pilot is flying VFR from Oklahoma City to Little Rock, Arkansas. Rain showers are occurring at Little Rock and are expected to continue for the next 24 hours with low ceilings and poor visibilities. The latter portion of this flight would be conducted in accordance with:

..... A. IFR

or

..... B. VFR

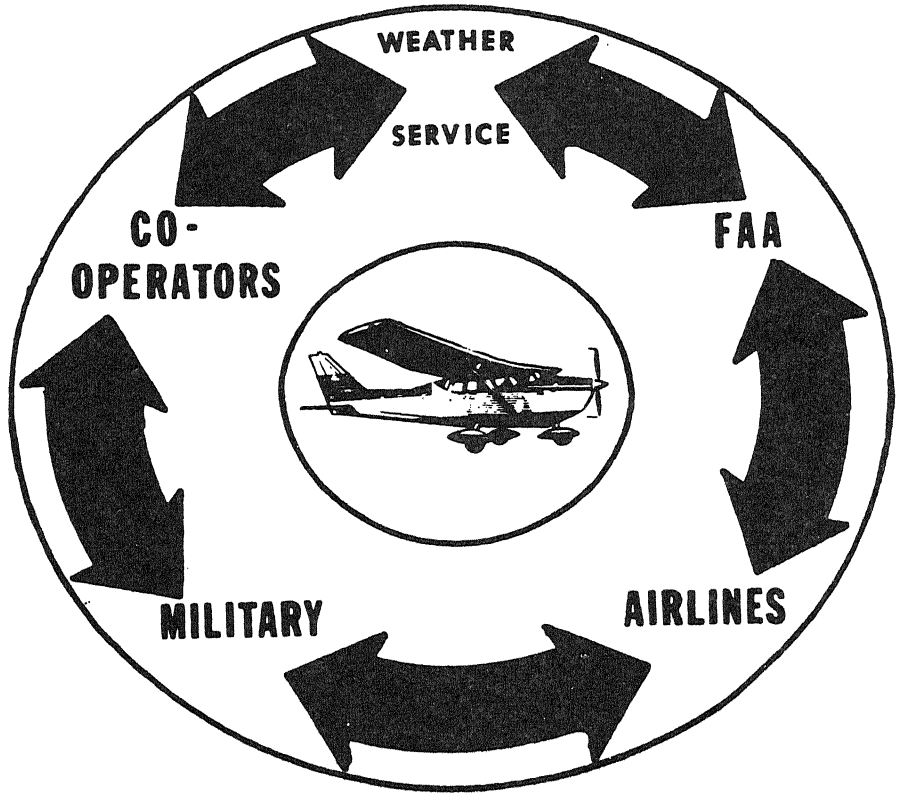
A.

10

Since weather conditions have such an important effect upon flight, it follows that pilots must have access not only to current information, but to forecasted weather conditions along their proposed route of flight. The next section will discuss the various types of aviation weather information available to pilots.

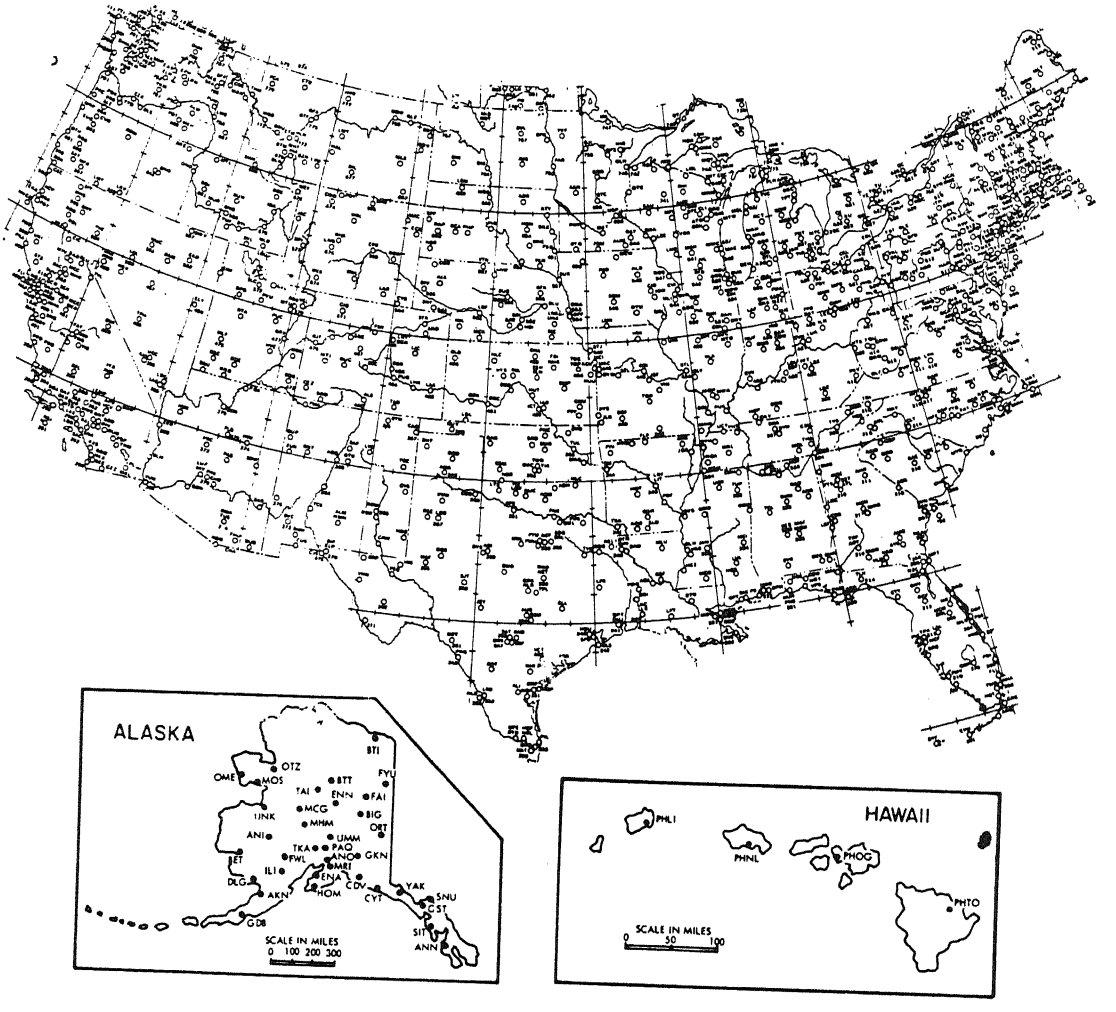
11

Weather service to aviation is a joint effort of the National Weather Service (NWS), the Federal Aviation Administration (FAA), the military weather services, and other aviation oriented groups and individuals.

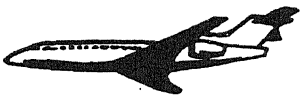


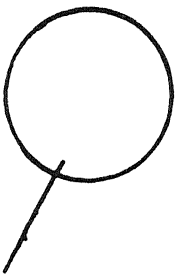
These sources are composed of private as well as governmental agencies. The National Oceanic and Atmospheric (NOAA) oversees and controls the National Weather System.

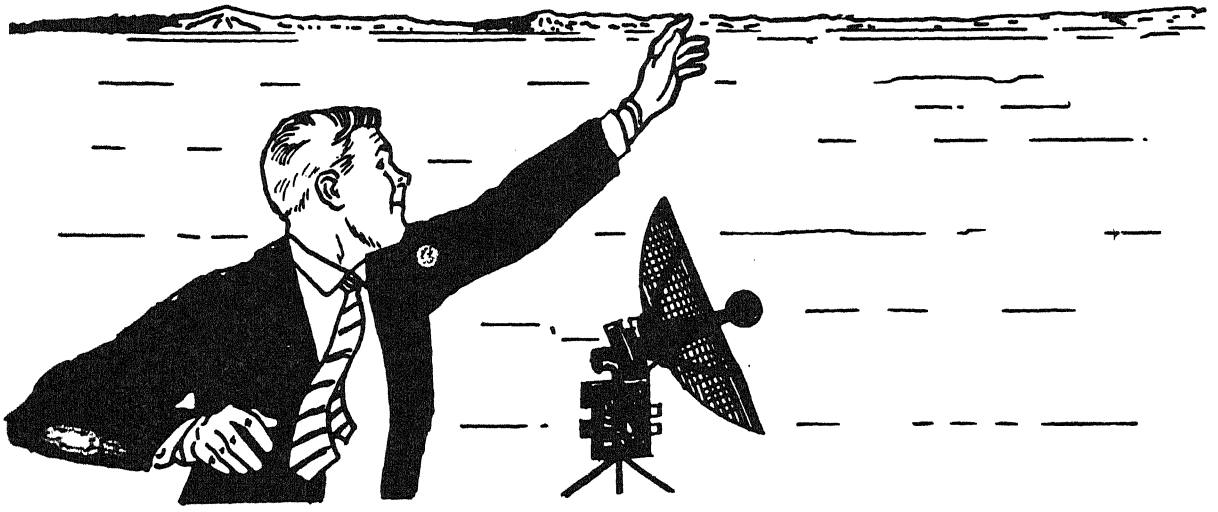
The weather observation is a measurement and/or estimate of the existing weather conditions which gives us a picture of the weather at the time of observation. Surface weather observations are taken each hour at the locations shown below.



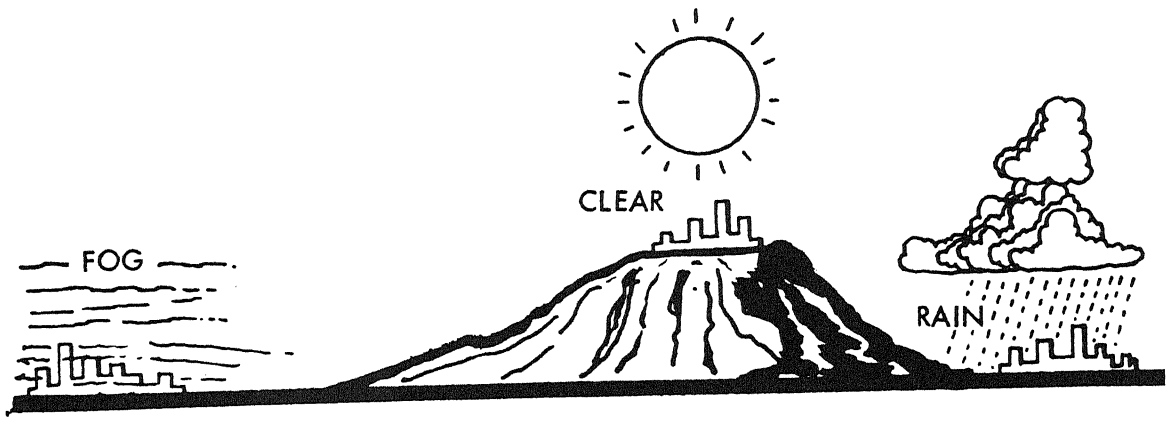
The weather observer normally takes a weather observation once each hour. However, any weather changes which affect flying are reported immediately. When taking weather observations, the observer may use ceilometer, ceiling lights, or balloons to determine cloud heights.







We have different kinds of weather occurring across the country simultaneously.



LOS ANGELES (LAX) | DENVER (DEN) | KANSAS CITY (MKC)

Over which city would the pilot most likely encounter VFR weather?

.....

Denver

15

A weather observation reflects the:

..... A. Current weather.

..... B. Weather that may occur.

A.

16

Which of the following are characteristics of a surface weather observation?

..... A. A weather forecast.

..... B. Is made every hour at individual locations throughout the United States.

..... C. Predicts if a Tornado will occur.

..... D. A report on local weather conditions.

..... E. Reflects if the weather is good or bad.

B.

D.

E.

17

Previously in frame 14 we emphasized the weather is quite different at various locations. Scan this example of a teletypewriter message supplying surface weather observations.

```
DEN CLR 15 170/36/35/1905/006/PATCHES SHLW GF ALQDS
FSR M20 BKN 90 BKN 10 28/25/2304/009/CLDS TPG MTNS E-S-SW
GLD S W2 X 1RLF 201/44/42/1412/012
HLC M9 BKN 15 OVC 9 239/46/44/1613/021
RSL S E9 BKN 20 OVC 10 260/44/42/1810G20/27
SLN M50 OVC 12 263/45/42/1410/029
CNK M36 OVC 15 263/44/42/1710/029
TOP M40 OVC 10R-286/45/41/1007/036
MKC M60 OVC 7R-283/45/38/0909/035
MCI M70 OVC 12R-44/35/1407/034
STJ E70 OVC 7R-42/38/1306/033
COS CLR 15 207/36/31/0406/013
PUB CLR 7 185/41/37/0000/011
LAX S W5 X 2F 176/39/36/2905/010
```

Note that each weather report begins with a 3-letter identifier. These 3 letters identify the airports from which weather is available. The surface weather reports above contain current weather information from:

.... A. Los Angeles (LAX), Denver (DEN), Kansas City (MKC), and many other cities.

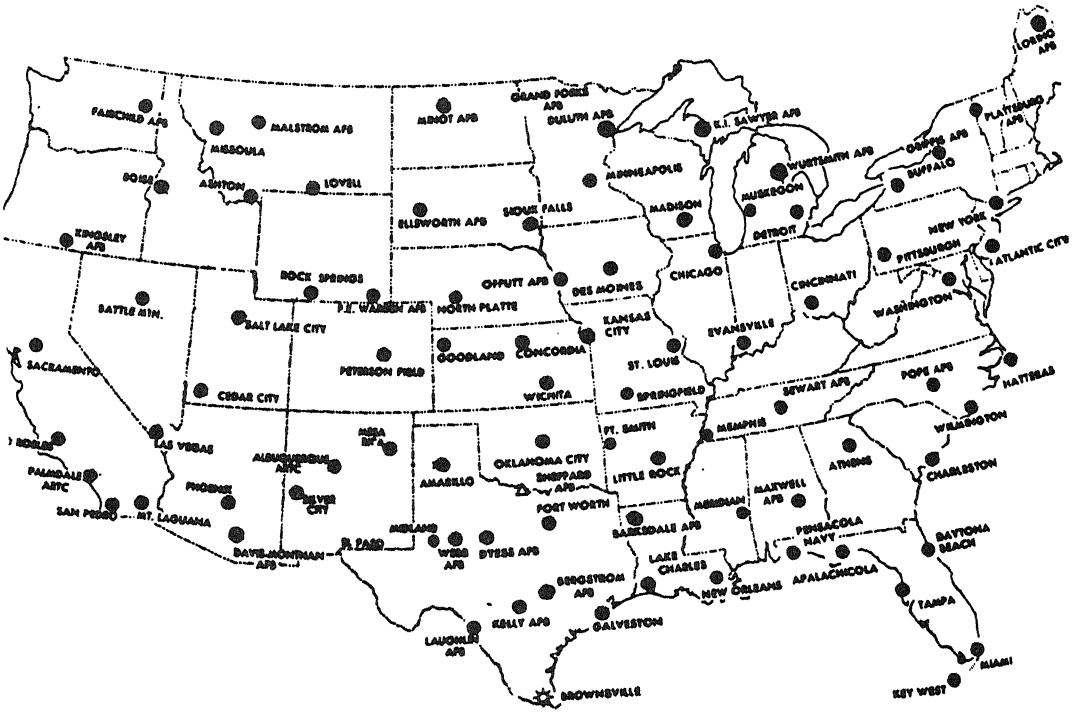
.... B. Los Angeles (LAX), Denver (DEN), Kansas City (MKC), only.

A.

18

In addition to the surface observations made by the observer, the weather system also provides for the detection of precipitation by using radar. The weather radar locations are shown below:

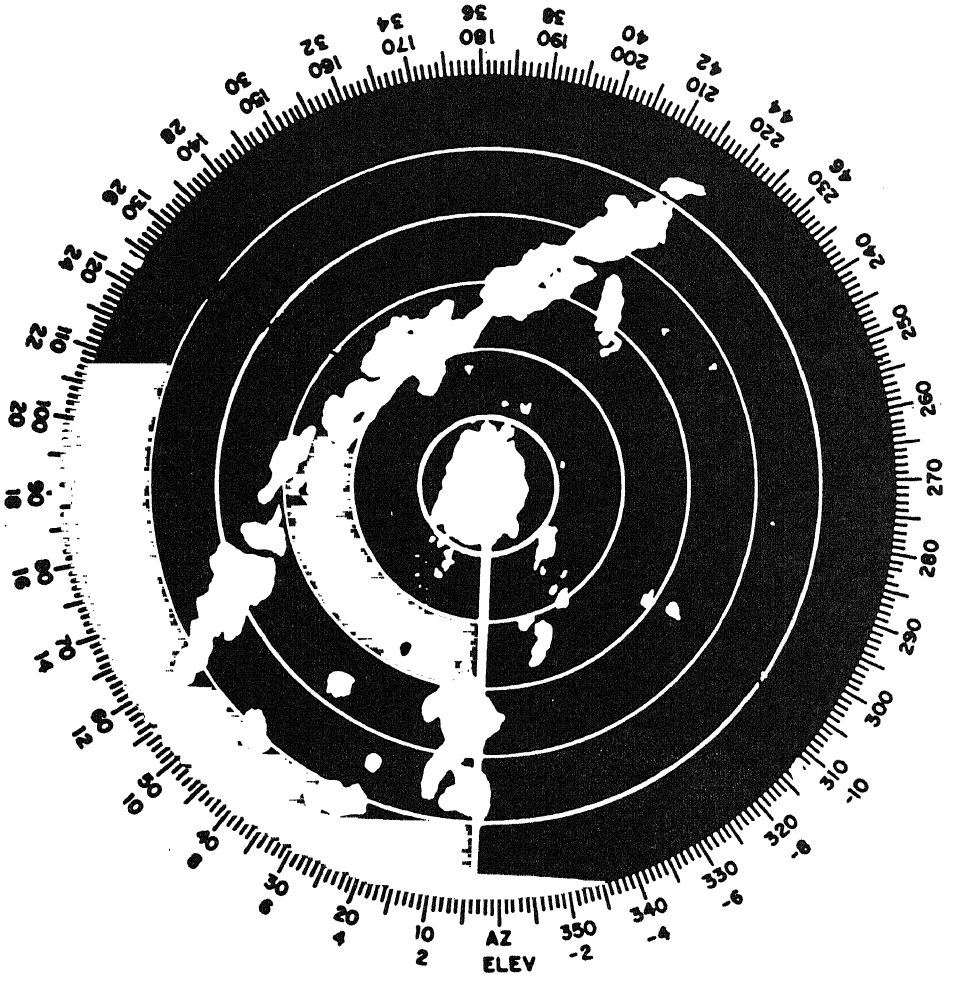
WEATHER RADAR NETWORK



Through the combined reporting of these radar locations, we are able to plot on a map the areas affected by precipitation.

19

Precipitation echoes appear on the radar scope as bright spots. The illustration below shows an area of precipitation would appear on a typical radar scope.



20

Under what conditions would the observer make a weather observation more often than once each hour?

.....

When certain weather changes affect flying.

21

What equipment is used disseminate surface weather observations?

.....

Teletypewriter

22

What is the purpose of making weather observations by using radar?

.....

To locate areas of precipitation

23

The following are examples of radar weather reports as they appear on the teletypewriter network.

AQQ 1333 AREA3TRWX/NC 278/185 134/110 153/195 232/170 C1208 MT 420 AT 186/66 TOP 410 AT 143/113 and 221/108
00 000 000 6410 888

SIL 1331 SPL AREA2TRWX3R/NC 284/210 33/50 119/160 188/215 C1312 MT 540 AT 197/88 TOP 450 AT 227/89 TROP 500 AREA2RW-/NC 353/120 315/100 18W C2312 MT 240 AT 333/111
1011 4114 6464 4622

GLS 1332 AREA2TRW + 1R-/NC 12/230 95/250 176/225 260/245 C2115 MT 380 67/40
0 202 200 2144 0002

24

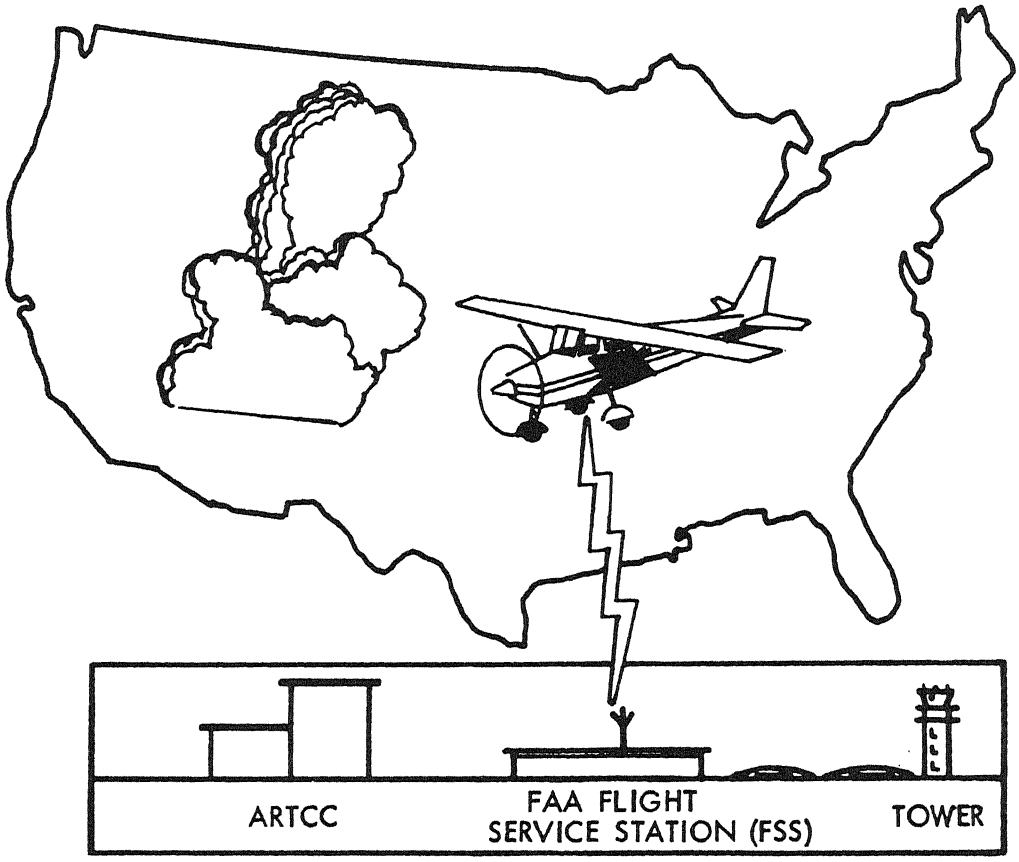
What is the difference between a radar observation and a surface observation?

.....

A surface observation is the weather as seen by the observer. A radar observation shows a precipitation pattern.

25

In addition to the surface observation and radar observation, the weather system receives Pilot Weather Reports (PIREPS). Pilots report the weather they see or encounter to stations, towers, and centers. See illustration below.

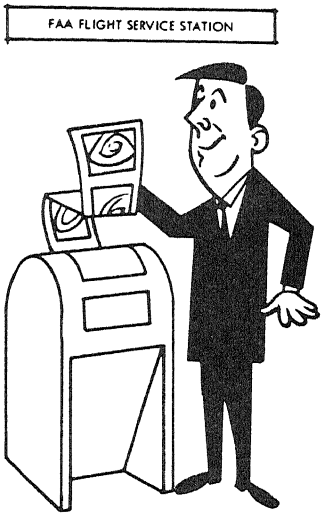


26

This is what the pilot says: "AT SIXTEEN TWENTY ZULU I ENCOUNTERED LIGHT RIME ICE AT FIVE THOUSAND FEET, TWENTY MILES SOUTH OF ALBUQUERQUE. I'M FLYING A CESSNA ONE SEVENTY TWO".

Station specialists receive these reports and transmit them by teletypewriter. The message may look like this:

ABQ PIREP 20S ABQ 1620 LGT RIME ICE 50 C172



All air traffic facilities may receive PIREPS. Which facility would most likely handle the majority of the messages?

.....

Flight Service Station.

27

A radar weather report comes from observing radar. A PIREP comes from:

.....

The pilot.

28

What does the contraction PIREP stand for?

.....

Pilot Weather Report.

29

What are the three types of current weather information that are made available to pilots and aircraft operators?

A. .....

B. .....

C. .....

A. Surface observations

B. Radar observations

C. Pilot weather reports

30

The National Weather Service System also includes weather forecasts, which are weather conditions expected to occur. Forecasts aid pilots and aircraft operators. One type of forecast is the Area Forecast. The Area Forecast is simply a forecast which covers specific geographical area. Shown below are the Weather Bureau offices which prepare area forecasts (FA) for transmission.

31

Is a weather forecast:

..... A. A prediction of weather expected to occur?
or
..... B. An observation of weather conditions as they exist at a given location?

A.

32

What is meant by "current weather"?

.....

The weather at observation time. (Observed weather.)

33

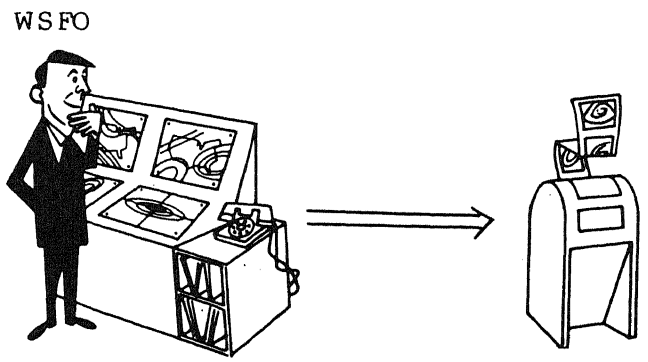
If current weather occurring at observation time, what is forecast weather?

.....

Forecast weather indicates conditions that are expected to occur.

34

After the Aviation Weather Forecaster prepares the Area Forecast (FA), it is transmitted to the various offices for use by pilots, aircraft operators, and Air Traffic Control Specialists as illustrated below.



35

Below is an example of an Area Forecast (FA) message. The area covered is Minnesota (MINN), Iowa (IA), Missouri (MO), Wisconsin (WIS), Illinois (ILL), Michigan (MICH), Indiana (IND), Kentucky (KY), Lake Michigan (LK MICH), U.S. portions Lake Superior (LK SUPR), and Huron.

Scan this example.

CHI FA 091240
13Z WED-07Z THU.
OTLK 07Z-19Z THU.

MINN IA MO WIS ILL MICH IND KY LK MICH U.S. PTN LKS SUPR AND HURON

HGTS ASL UNLESS NOTED...

SYNS...CDFNT S OHIO WSWWD ACRS S ILL S MO MOVG SLOLY SWD TO EXTRM KY NW TENN N ARK BY 07Z THU.

SIGCLD AND WX...

SE HLF MO S THIRD ILL S IND AND KY...
AHD CDFNT 30-50 SCT VRBL BKN 80-120 BKN LYRS TO 180 WDLY SCT 3-5 TRW/RW CB TOPS 450. BHD CDFNT 40-50 SCT VRBL BKN MCHG ARND 00Z NO SIGGLD AND WX. E9...O S KY CIGS OCLY BLO 10 AND VSBYS FQTLY BLO 3 MIS IN FOG AND H TIL 15Z. OTLK...KY MVFR/CIGS. ELSW VFR.

LK SUPR UPR MICH N HLF LK MICH N THIRD LWR MICH LK HURON...CIGS 40-50 SOME WDLY SCTD RW TOPS 120-150. BMG AFT 00Z OVR LAND AREAS 40-50 SCT. OTLK...VFR.

MINN IA NW HLF MO WIS N TWO THIRDS ILL S HLF LK MICH S TWO THIRDS LWR MICH N IND...
NO SIGCLD AND WX BCMG 15Z-17Z 40-50 SCT VRBL BKN. AFT 00Z NO SIGCL AND WX. OTLK...VFR.

ICG...SVR MXD ICG IN CBS. FRZLVL 80 N MINN SLPG UP TO 150 S MO KY.

The fourth line in this message represents the states included in the message.

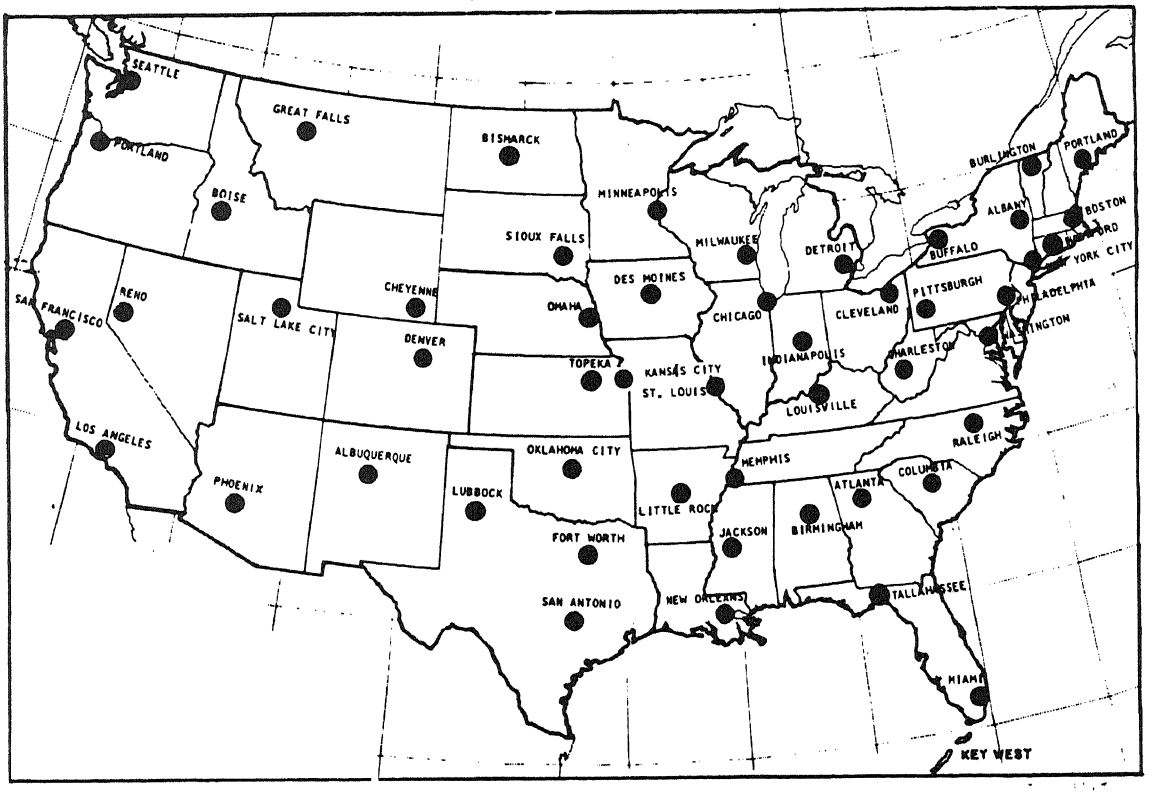
36

Name the forecast that indicates weather expected to occur over a wide area.

.....

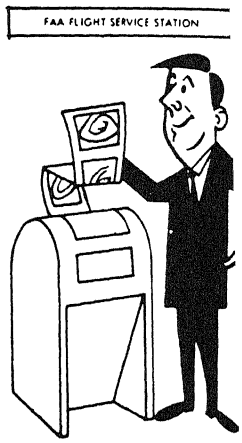
Area Forecast.

A second type of forecast is the Terminal Forecast (FT). As indicated by the name, it is the weather forecaster's prediction of what the weather is expected to be at a specific airport during a specified time. Shown below are the Weather Bureau officers that issue Terminal Forecasts.



38

The Terminal Forecasts (FT) are transmitted to the various offices throughout the United States for use by pilots, aircraft operators and Air Traffic Control Specialists. A Terminal Forecast message looks like this:



OKLAHOMA 041445
ADM 041515 CLR 6H. 17Z SCT. 01Z CLR. 09Z MVFR GF..
GAG 041515 CLR..
HBR 041515 CLR..

MLC 041515 CLR 6H. 17Z 40 SCT. 01Z CLR. 09Z MVFR GF..
OKC 041515 CLR..
PNC 041515 CLR..
TUL 041515 CLR. 18Z 40 SCT. 00Z CLR. 09Z MVFR GF..

MISSOURI 041450
CGI 041515 C10 BKN 3GFH. 17Z 10 SCT C90 BKN 5H. 19Z 50 SCT 80 SCT.
00Z 250-
SCT. 09Z VFR..

Compare the area of coverage between a Terminal Forecast and an Area Forecast.

.....

.....

.....

The Terminal Forecast, forecasts the weather for a specific airport, and the Area Forecast indicates expected weather for a large geographical area.

39

A pilot plans to arrive in his private aircraft at Cleveland at 2:30 PM. If he leaves Kansas City at 8:00 AM, what type of forecast will provide him with the expected weather for his landing?

.....

Terminal Forecast.

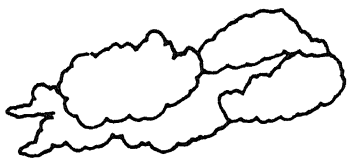
40

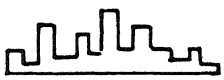
Which type of forecast will give him the weather expected over Indiana, Illinois, and Missouri during his flight?

.....

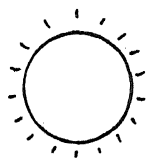
Area Forecast

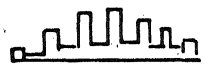
41



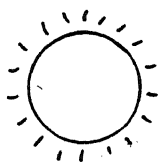


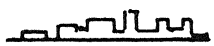
SAN FRANCISCO
(SFO)





CHICAGO MIDWAY
(MDW)





ALBUQUERQUE
(ABQ)

Weather observers report the weather shown above. What is the difference between this report and a Terminal Forecast for these cities?

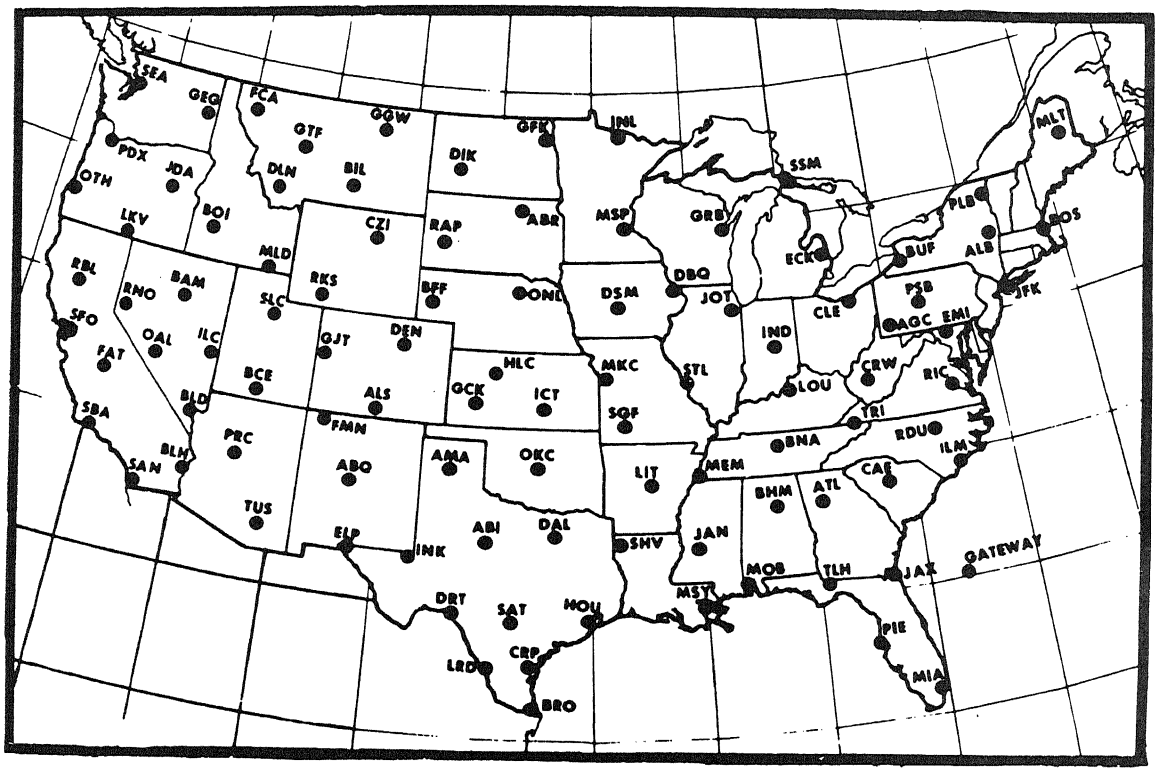
.....

.....

The observer reports the weather he sees and the Terminal Forecast is for a future time.

42

The Winds and Temperatures Aloft Forecast (FD) is a third type of forecast. This forecast predicts the winds and temperatures aloft at certain levels above the ground. It is prepared by an electronic computer in Suitland, Maryland and contains information for the locations shown on the map below.



3

The Winds and Temperatures Aloft Forecast (FD) message looks like this:

Scan this example:

FDUS1 KWBC 110545
DATA BASED ON 110000Z

VALID 111200Z FOR USE 0600-1500Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ABI		3610-04	3309-08	3111-14	2716-26	2624-37	263149	273552	274152
ABQ			3415-06	0127-12	3536-24	3557-36	348149	348755	337056
ALS				3625-13	3536-25	3548-37	356650	347457	346258
AMA		3616	0119-09	3519-14	3322-27	3325-38	332851	332854	313154
ATL	0407	9900-03	2516-05	2529-09	2456-17	2480-28	740941	743048	744255
BHM	0205	2605-03	2515-06	2525-09	2451-18	2477-28	740841	743148	743554
BLD	0906	9900+05	3409-01	3319-05	3341-17	3253-30	326846	327755	318164
BNA	3607	2808-08	2716-10	2724-13	2548-22	2575-32	740844	742951	742253
BOI		1815-03	2317-04	2626-07	2832-19	2945-32	296348	297356	297565
BRO	0312	9900+05	2616-01	2731-06	2655-17	2576-26	741541	742549	750854
CRP	0408	9900+02	2611-04	2722-09	2545-20	2467-29	740743	751050	259453
DAL	0216	3311-05	3111-09	2912-14	2523-25	2440-36	245748	246253	255752

44

In planning a flight from Oklahoma City, Oklahoma, to St. Louis, Missouri, what type forecast would the pilot use to determine the wind and temperature at 9000 feet?

.....

Winds and Temperatures Aloft Forecast.

45

Below is a list of weather forecast information requestd by different pilots. Write the abbreviations of the forecasts in which this information is found.

..... A. The forecast for San Francisco (SFO).

..... B. The forecast for Arkansas, Tennessee, Kentucky, and Mississippi.

..... C. The northwestern half of Texas and the western half of Oklahoma.

..... D. Winds for 12,000 feet over Des Moines, Iowa (DSM).

..... E. Temperatures at 30,000 feet for Minneapolis, Minnesota (MSP).

FT A.

FA B.

FA C.

FD D.

FD E.

46

List the three forecasts available to pilots, aircraft operators, and Air Traffic Control Specialists.

A. .....

B. .....

C. .....

A. Terminal Forecast

B. Area Forecast

C. Winds and Temperatures Aloft Forecast

47

Name the three observations that reflect current weather.

A. .....

B. .....

C. .....

A. Surface observations

B. Radar observations

C. Pilot weather reports

48

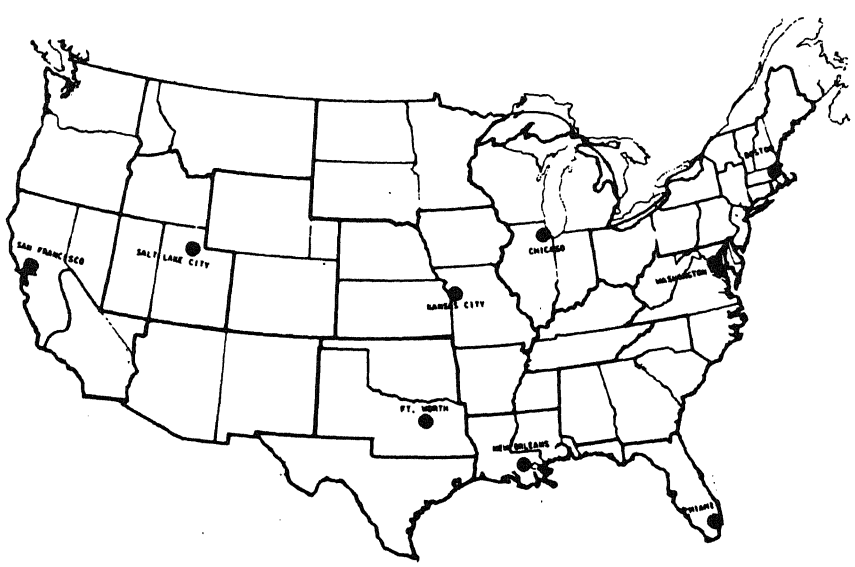
What equipment is used to prepare Winds and Temperatures Aloft Forecasts (FD)?

.....

Computer

49

When any of the Area Forecast Offices shown below anticipates hazardous weather forming or occurring which may affect all aircraft in flight, they issue a message called a SIG-nificant METeorological Information message. The message title is shortened to SIGMET.



50

A SIGMET message looks like this.

FL DEN 090230
090230-090700

SIGMET BRAVO 7. ROCKY MTN AREA COLO AND SRN WYO. STANDING WVS E OF RDGS CAUSING EXTNSV AREAS OF STG UP AND DOWN DRAFTS AND LCLY SVR TURBC TO 180. CONDS CONTG PAST 0700Z

The SIGMET above warns pilots of strong up and down drafts and locally severe turbulence up to 18,000 feet.

51

These SIGMET messages are sent to all offices in the affected area for delivery to the pilots that are flying through or plan to fly through the area outlined in the message.

52

The Aviation Weather Forecaster also prepares messages called AIRmen's METeorological Information (AIRMET). An AIRMET forecasts another type of unfavorable weather. These weather conditions, while not as hazardous as SIGMET conditions, could still affect the safety of flight. As in the SIGMET, the extent of the weather covered by this message is specified in the advisory.

Here is an example of an AIRMET.

FL GSW 240920
240920-241400

AIRMET CHARLIE 9. OVR NWRN TEX AND WRN OKLA GENLY W OF ENID BIG SPRING LN CIGS FQTLY BLO 1 THSD FT VSBYS LCLY BLO 2 MI. CONDS CONTG PAST 14Z

53

What is the name of the message that warns the pilot of weather that could damage his aircraft?

.....

SIGMET

54

What is the name of the message that warns the pilot of weather that only affects light aircraft?

.....

AIRMET

55

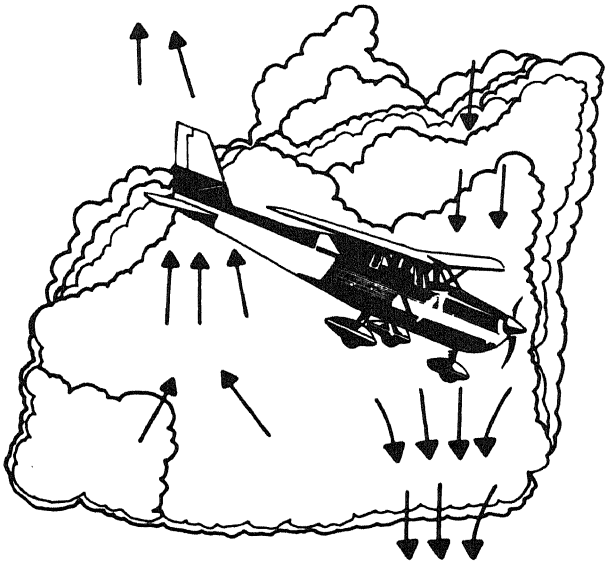
What other kind of forecast is prepared by the Weather Bureau Office issuing SIGMETs and AIRMETs?

.....

Area Forecast.

56

Turbulence is the bouncing of an aircraft in flight by sudden changes in directions of airflow. If the forecaster expects these irregular air currents to cause only discomfort to passengers and crew, he would advise pilots by an AIRMET. If however, it is expected that the turbulence could damage the aircraft, the forecaster would warn the pilots through a SIGMET.



57

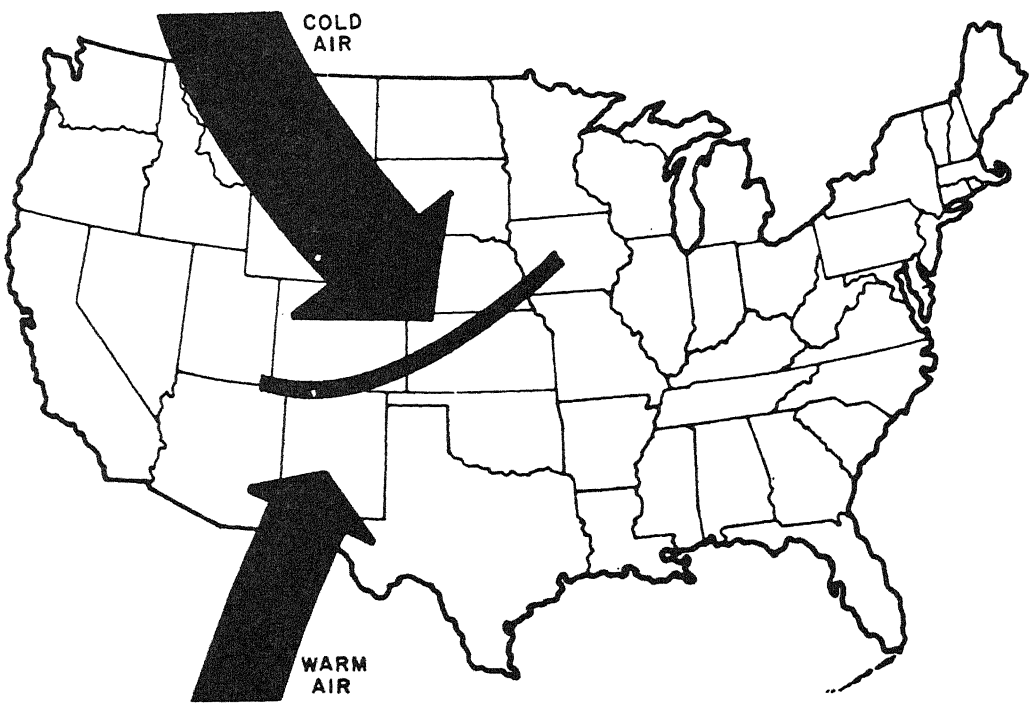
If an airplane flies into a strong upward flow it will be forced up. What might be a danger if an aircraft encounters a strong downward flow of air at a low altitude?

.....

Could be forced into a ground object - such as a mountain top or hill.

58

An air mass is a large body of air which contains relatively uniform properties and covers a large area. This could be a cold body of air moving from the Arctic Zone, or a warm body of air fro the Tropical Zone. These air masses are usually associated with high pressure systems.



59

An air mass is a body of air covering a large area and is usually associated with what type of pressure system?

.....

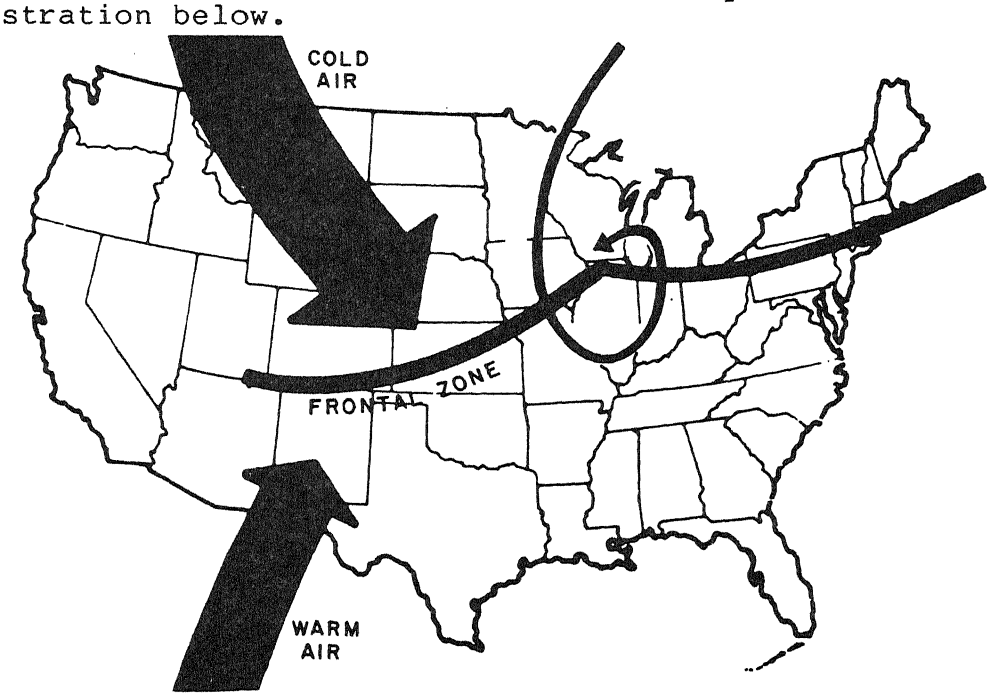
High pressure.

60

A frontal zone forms in the contact area between two differing air masses. As shown in frame 58, this formal zone is the heavy line between the two air masses.

61

Sometimes a low pressure area develops within a frontal zone. Low pressure areas are characterized by counterclockwise flow of air around the center. Place an L in the low pressure area on the illustration below.



Your answer should look like this.

62

What is the direction of air flow around a low pressure center?

.....

Counterclockwise.

63

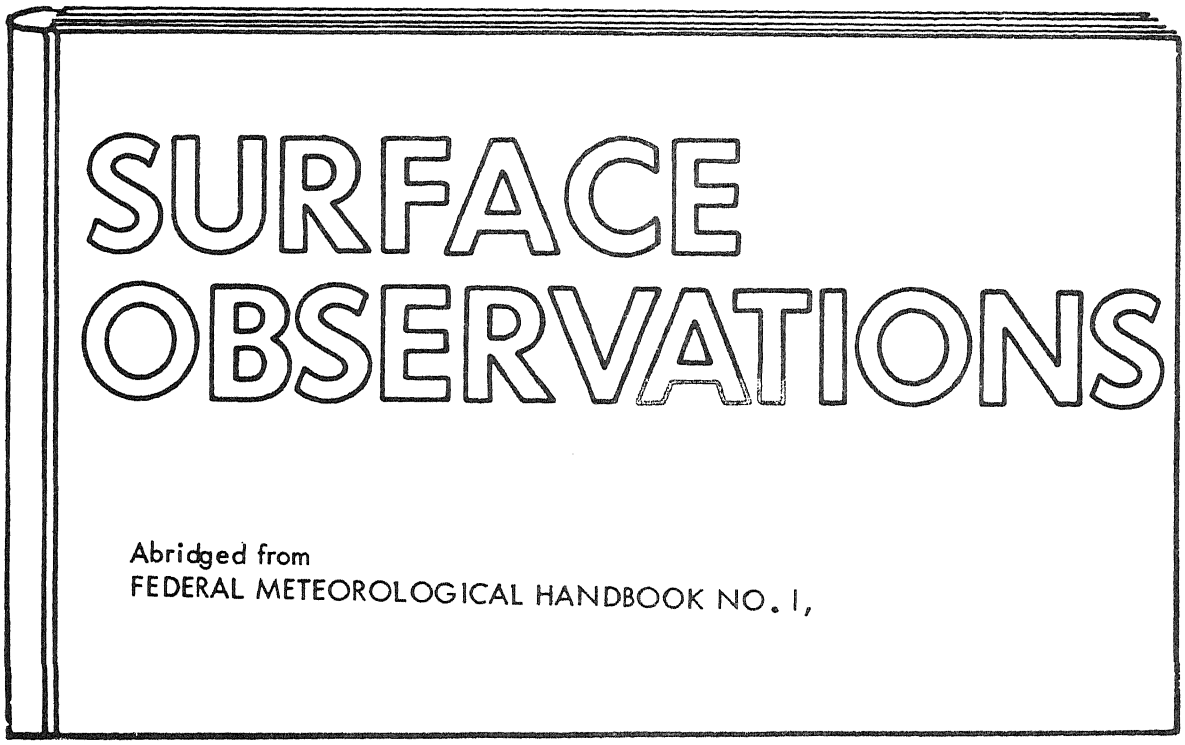
What is a frontal zone?

.....

The zone of contact between two air masses.

64

The Federal Meteorological Handbook No. 1. (FMH No. 1) is the handbook of uniform instructions for weather observing and reporting. This handbook provides the framework for identifying and reporting meteorological conditions in a standard format.



Select from the following reasons why a standard format is desirable.

..... A. Rapid transmission.

..... B. Rapid coding.

..... C. Easy interpretation.

A.

B.

C.

SECTION 3

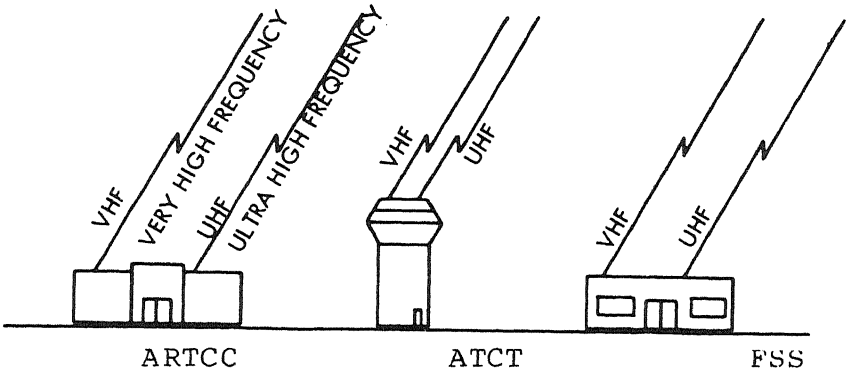
NAVAIDS

65

As mentioned earlier, a vital part of the National Airspace Syst involves the use of navigational aids. These electronic aids ar used by pilots to navigate from point to point and to make landi approaches at airports during IFR conditions. A fundamental knowledge of the various types of navigational aids will help yo to provide better service to the flying public.

66

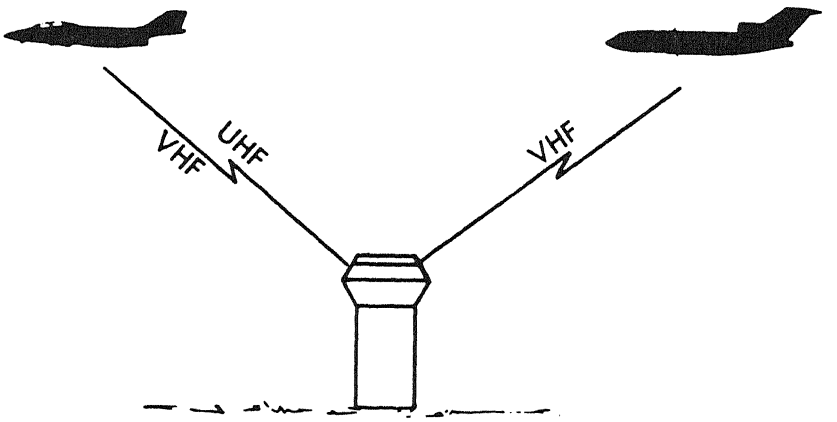
There are three types of facilities which provide air traffic service. They are Air Route Traffic Control Centers (ARTCC), Airport Traffic Towers (ATCT), and Flight Service Stations (FSS).



Each of these facilities use two types of radio frequencies to communicate with aircraft. (1) Very High Frequency (VHF), (2) Ultra High Frequency (UHF).

67

Civil aircraft use VHF radio equipment. Military aircraft primarily use UHF; however, some have both UHF and VHF.



What are two bands of radio frequencies used in the air traffic system?

.....

.....

UHF

VHF

68

What do VHF and UHF mean?

.....

.....

Very High Frequency

Ultra High Frequency

69

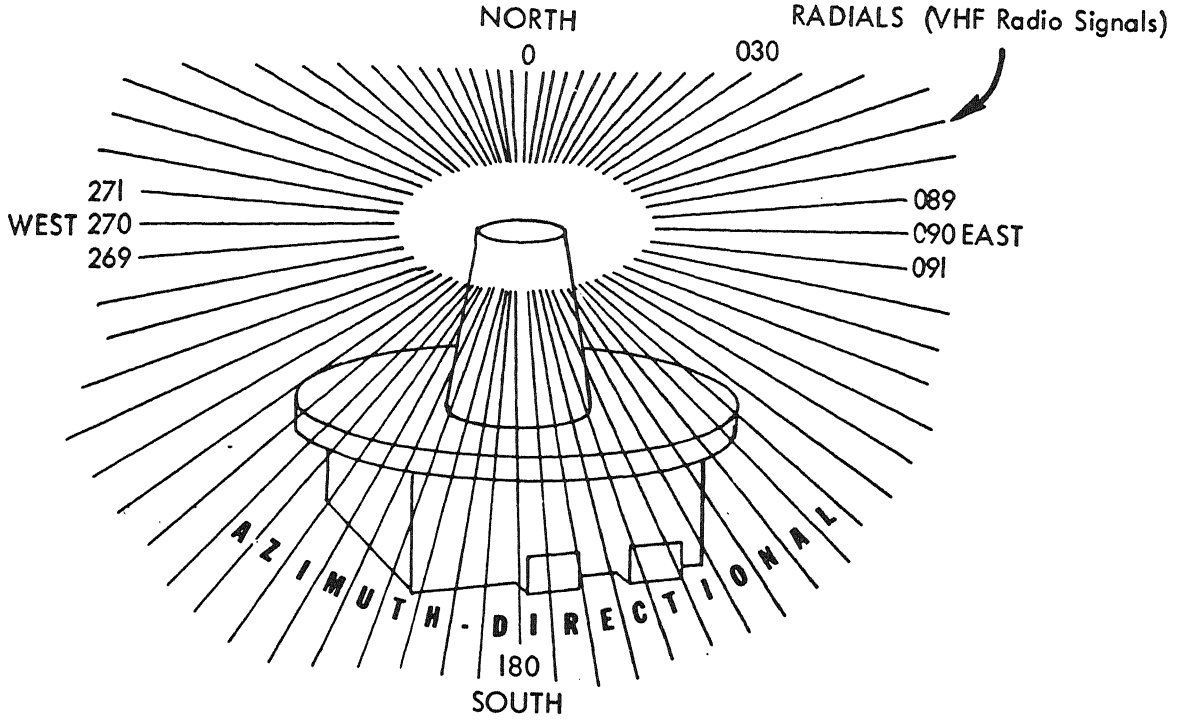
Which frequency band would an air traffic specialist use to transmit an advisory message to most military aircraft?

.....

UHF

70

The VHF Omni-directional Radio Range (VOR) transmits radio signals (azimuth) called radials. There are 360 radials extending outward from a VOR like spokes on a wheel.



What are radio signals transmitted by a VOR called?

.....

Radials.

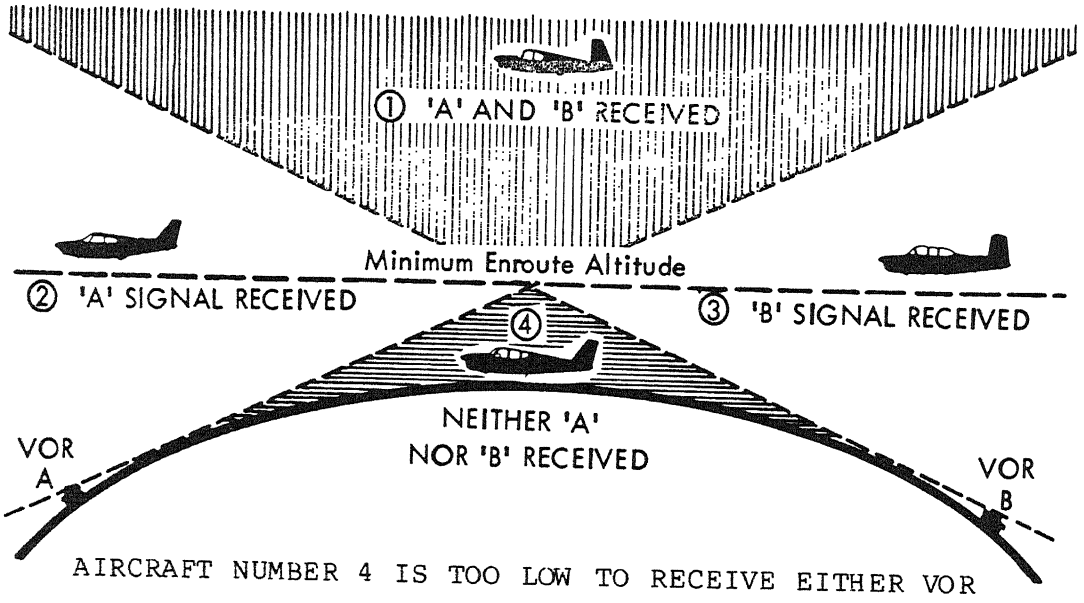
71

How many radials are transmitted by a VOR?

.....

360

The purpose of the VOR is to provide a simple and accurate means of navigation. They are spaced about 80 miles apart because an aircraft flying at the Minimum Enroute Altitude (MEA) can only receive a VOR for about 40 miles; then the pilot must change his VOR receiver in the aircraft in order to navigate to the next VOR. Scan the diagram below.



AIRCRAFT NUMBER 4 IS TOO LOW TO RECEIVE EITHER VOR

What does MEA mean?

.....

Minimum Enroute Altitude

73

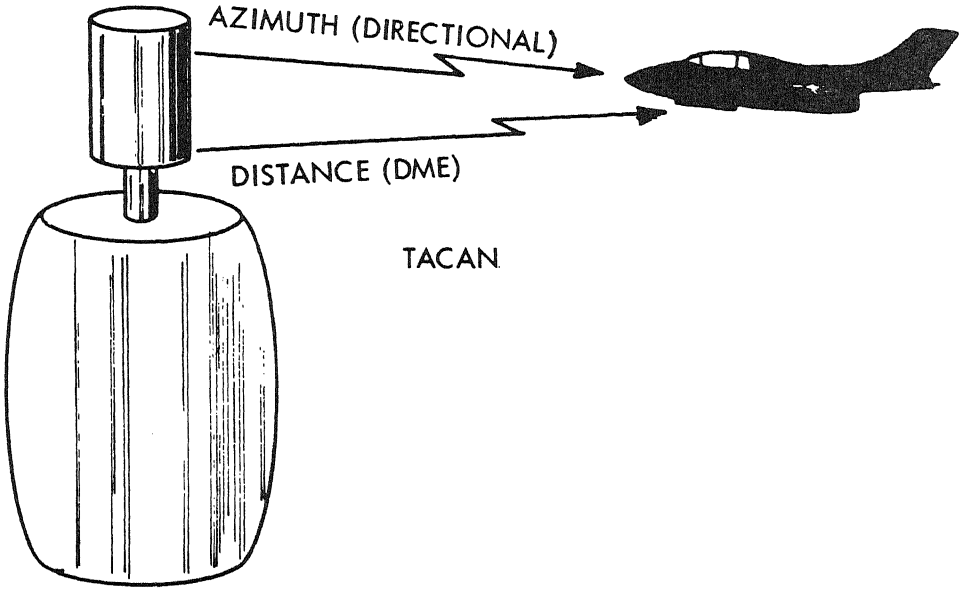
Which aircraft is flying below the MEA and cannot use VOR navigation? Refer to frame 72.

.....

Aircraft number 4.

74

TACtical Air Navigation (TACAN) is the UHF omni-directional radio range. These are located at most military installations. Scan the diagram below:



Distance Measuring Equipment (DME) provides distance (miles) from the navigational aid (TACAN) to the aircraft. A signal is transmitted by the DME in the UHF spectrum (wave lengths).

75

What does DME mean?

.....

Distance Measuring Equipment

76

A TACAN provides what kind of information?

.....

Direction and distance.

77

What information is provided by TACAN that is not provided by VOR?

.....

Distance

78

Which can a pilot navigate on when flying an aircraft equipped with VHF?

..... A. TACAN

..... B. VOR

B.

79

Which of the following is normally equipped to use TACAN?

..... A. Air Carriers

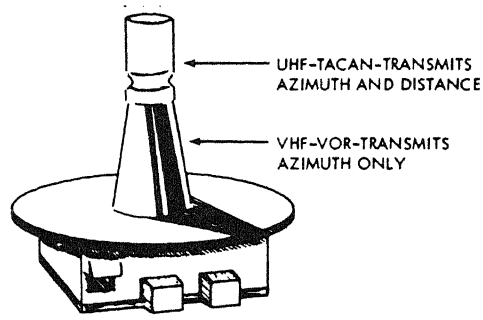
..... B. Military

..... C. General Aviation

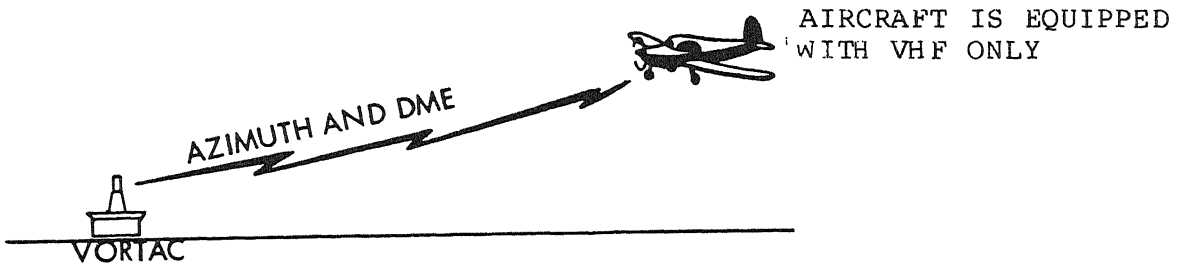
B.

80

A VORTAC is a navigational aid which has VOR and TACAN located at the same site.



81



What information can the above aircraft receive from a VORTAC?

..... A. Azimuth

..... B. DME

A.

82

A military aircraft equipped with a TACAN receiver can receive which of the following from a VORTAC?

..... A. Azimuth and DME

..... B. Azimuth only

..... C. DME only

A.

83

If an aircraft is at the MEA, what is the approximate reception distance froma VOR/VORTAC/TACAN?

..... A. 49

..... B. 29

..... C. 39

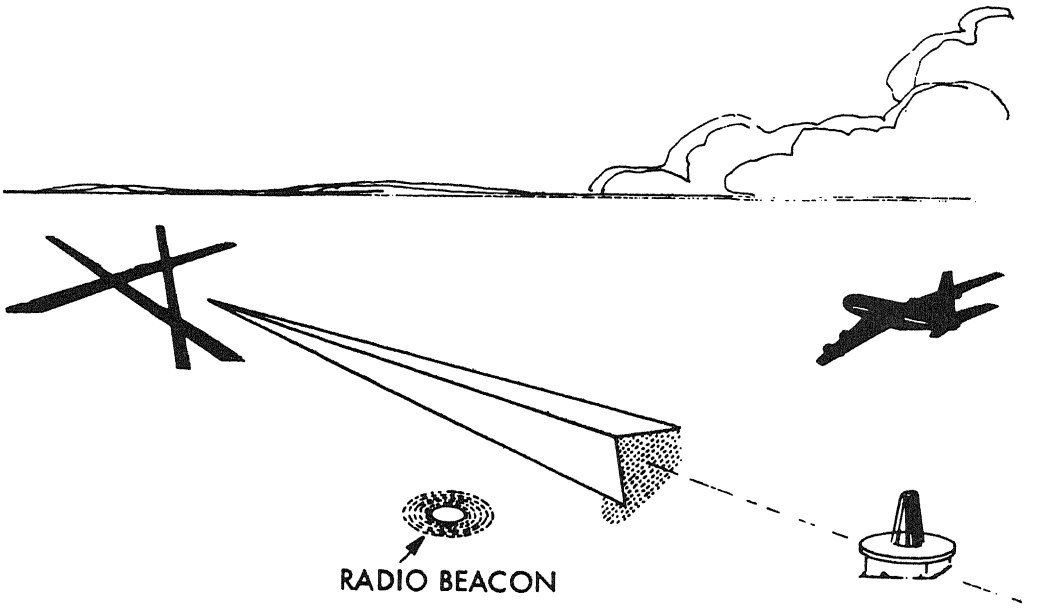
C.

84

A homing facility, better known as a radio beacon, is used in the vicinity of an airport as an approach aid. The radiated pattern is circular, i.e., nondirectional, being similar to the pattern produced by a commercial radio station. The radio beacon does not provide radials like a VOR, VORTAC, and TACAN. It is a different type of navigational aid.

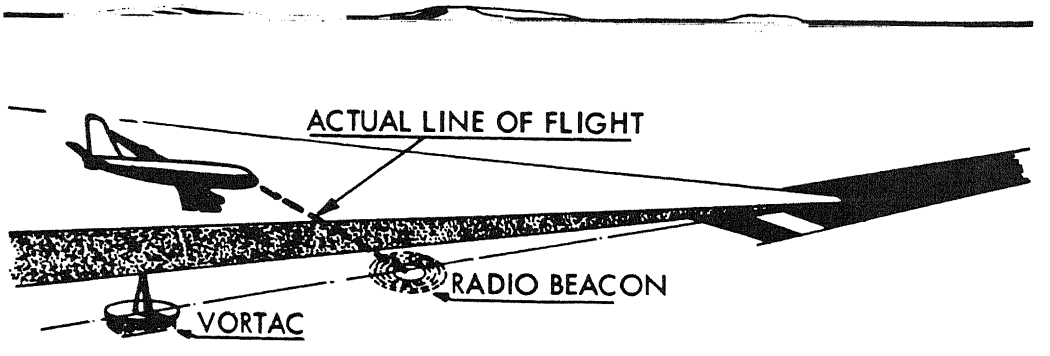
85

Pilots must have some means of getting from the en route course to the instrument landing system serving the airport. A pilot will home in on i.e., fly toward the radio beacon which is located near the airport.



86

These radio beacons are normally associated with the airport landing system.



The only information received is a straight course to or from the station.

87

What type of pattern is radiated by the radio beacon?

.....

Circular or nondirectional

88

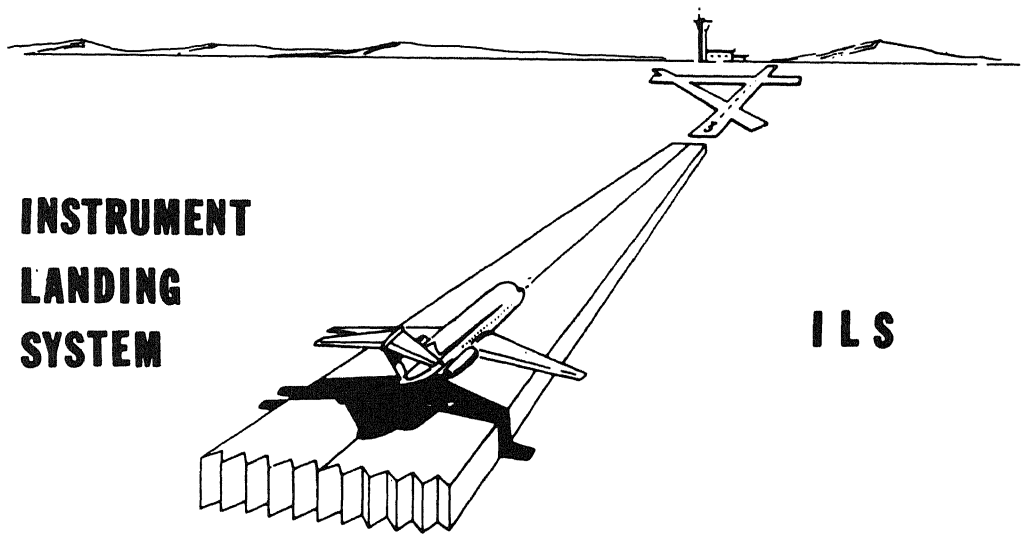
A pilot uses what kind of navigational aid to fly from a VOR/VORTAC to the airport?

.....

Radio beacon

89

The Instrument Landing System (ILS) is the most widely used landing system in operation today. Scan diagram below:



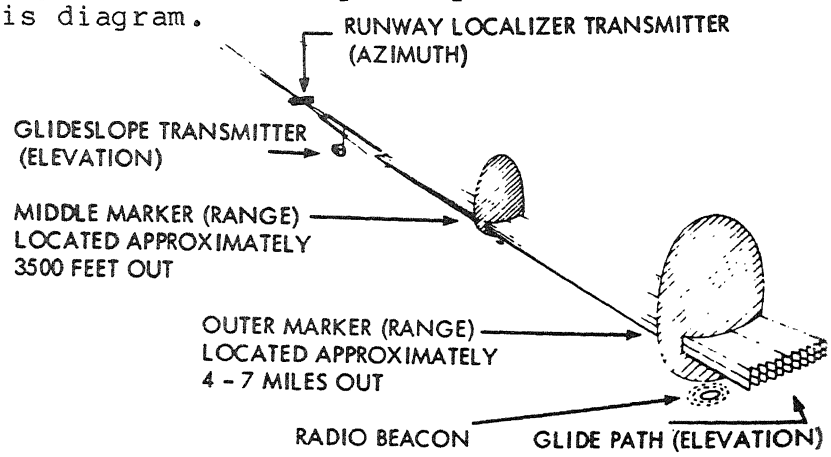
What three words come to mind when you hear ILS?

.....

Instrument Landing System

90

This approach aid (ILS) provides the pilot with azimuth (direction elevation (height), and range (distance) through the use of navigational equipment in the aircraft. An aircraft with ILS receiver equipment can make an approach to an airport by reference to these instruments. Study this diagram.



The ILS system has three primary elements: (1) localizer, (2) glide path, (3) and markers. The glideslope produces the glide path, which is elevation. Normally the radio beacon and the markers are located at the same site, however, these are two completely different aids. When the aircraft passes over the outer and middle markers, the pilot receives a flashing light.

91

What is the purpose of the ILS?

.....

To aid the pilot in making an approach to the runway.

92

Which of the following components of an ILS designed is to provide the pilot with directional (azimuth) guidance to the runway? Refer to frame 90.

..... A. Markers

..... B. Radio Beacons

..... C. Glide Path

..... D. Localizer

D. (This informs the pilot to turn right or left in order to remain on course.)

93

What piece of equipment produces the glide path (elevation)? Refer to frame 90.

.....

Glideslope transmitter. (This informs the pilot to climb or descend in order to stay on the glide path.)

94

What is the purpose of the ILS middle and outer markers?

.....

Informs the pilot of his distance from the landing runway.

95

Which of the following aids can a pilot tune in to fly from a VOR/ VORTAC to the ILS?

..... A. Localizer

..... B. Glide path

..... C. Radio beacon

C.

96

Name the three basic components of the ILS.

.....

.....

.....

Localizer

Glide Path

Markers

SECTION 4

AERONAUTICAL CHARTS

97

Aeronautical charts are maps which are used extensively by pilots as well as controllers. They are one of the main tools made avail able to the controller for the movement of air traffic. They are designed for use which involves the application of VFR and IFR. Charts show the pilot and the air traffic specialist the location of navigational aids, airport, terrain, controlled and uncontroll airspace. A knowledge of their use and limitations is necessary become a proficient Air Traffic Control Specialist.

98

You must be able to interpret and use the following four charts:

(1) Sectional Aeronautical Chart for VFR flights.

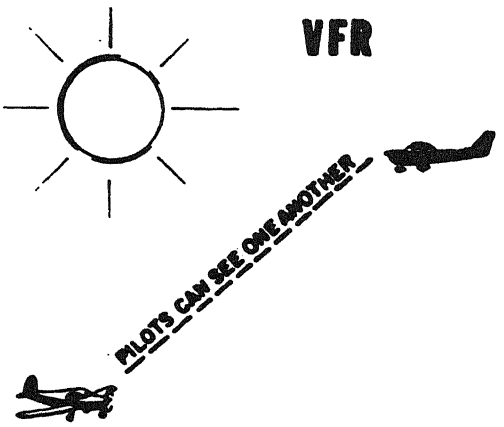
(2) En route Low Altitude Chart for IFR flights.

(3) En Route High Altitude Chart for IFR flights.

(4) Approach and Landing Chart.

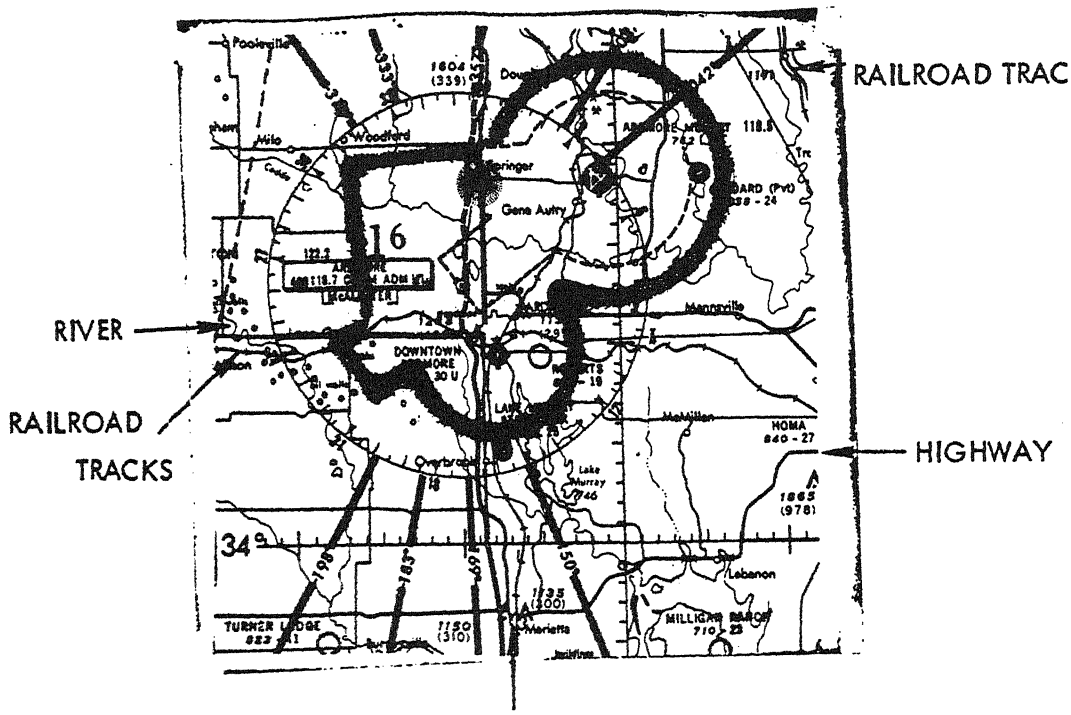
99

The Sectional Aeronautical Chart is used by the pilot who flies VFR.



100

A sectional chart shows features on the ground which the pilot can recognize and use to assist him in navigation. Examples are rivers, highways, railroad tracks, and towers (radio stations). Below is an example of this chart:



What are some of the major landmarks found on a sectional chart which can be used as navigational aids?

.....

Rivers

Railroad tracks

Highways

Towers

101

The following example is the front of a sectional chart. Scan and study the dates; they are important.

DALLAS - FT WORTH
SECTIONAL AERONAUTICAL CHART
SCALE 1:500,000

Lambert Conformal Conic Projection Standard Parallels 33°20' and 38°40

Topographic data corrected to April 1976

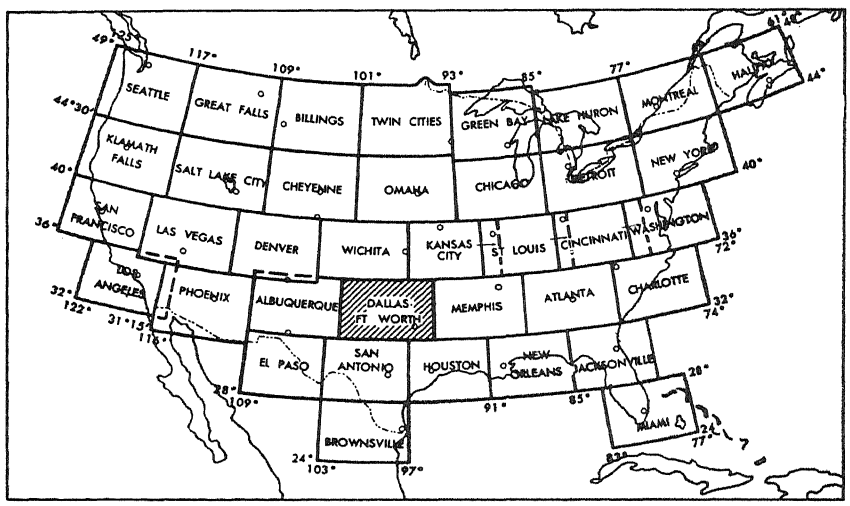
16 TH EDITION July 15, 1976

Includes airspace amendments effective July 15, 1976
and all other aeronautical data received by May 27, 1976
Consult appropriate NOTAMs and Flight Information
Publications for supplemental data and current information.

This chart will become OBSOLETE FOR USE IN NAVIGATION upon publication of the next edition scheduled for JANUARY 27, 1977

PUBLISHED IN ACCORDANCE WITH INTER-AGENCY AIR CARTOGRAPHIC COMMITTEE SPECIFICATIONS AND AGREEMENTS APPROVED BY:

DEPARTMENT OF DEFENSE * FEDERAL AVIATION ADMINISTRATION * DEPARTMENT OF COMMERCE



When will the above Dallas-Ft. Worth sectional chart become obsolete?

.....

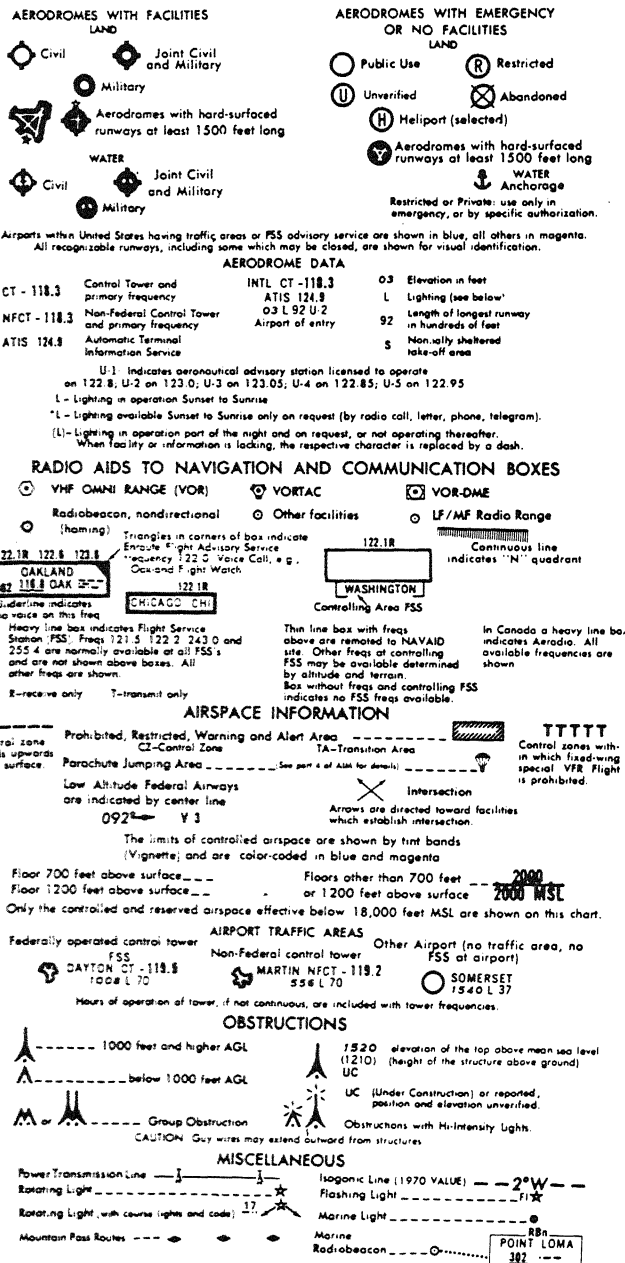
January 27, 1977

This page is the back cover of the Dallas-Ft. Worth Sectional Chart. Scan this legend of symbols which can be found on the inside of this chart.

DALLAS - FT WORTH

AERONAUTICAL SYMBOLS

AERODROMES



RADIO AIDS TO NAVIGATION AND COMMUNICATION BOXES

AIRSPACE INFORMATION

The limits of controlled airspace are shown by tint bands (Vignette) and are color-coded in blue and magenta

Floor 700 feet above surface
Floor 1200 feet above surface
Floors other than 700 feet or 1200 feet above surface 2000 2000 MSL

Only the controlled and reserved airspace effective below 18,000 feet MSL are shown on this chart.

AIRPORT TRAFFIC AREAS

Hours of operation of tower, if not continuous, are included with tower frequencies.

OBSTRUCTIONS

CAUTION Guy wires may extend outward from structures

MISCELLANEOUS

103

What chart does a pilot use to fly VFR?

.....

Sectional chart

104

Why is the sectional chart an ideal aid for the pilot who flies under Visual Flight Rules?

.....

It identifies landmarks which can be seen by the pilot.

105

Which of the following can be found on a sectional chart? Refer to frame 102.

..... A. Aerodromes (airports)

..... B. Aerodrome (airport) data

..... C. Radio aids to navigation

..... D. Airspace information

..... E. All of the above

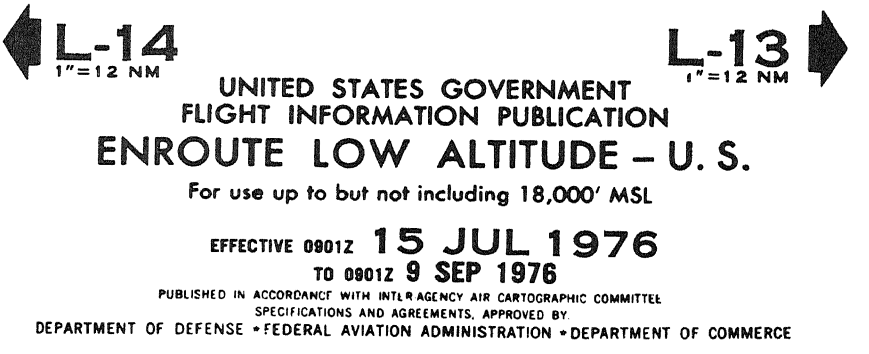
E.

106

Normally IFR pilots cannot see one another, nor can they always see the ground. This is the reason for omitting topographical details (cities and towns, railroad tracks, highways, and etc.) from the enroute low and high altitude charts. Scan diagram below:

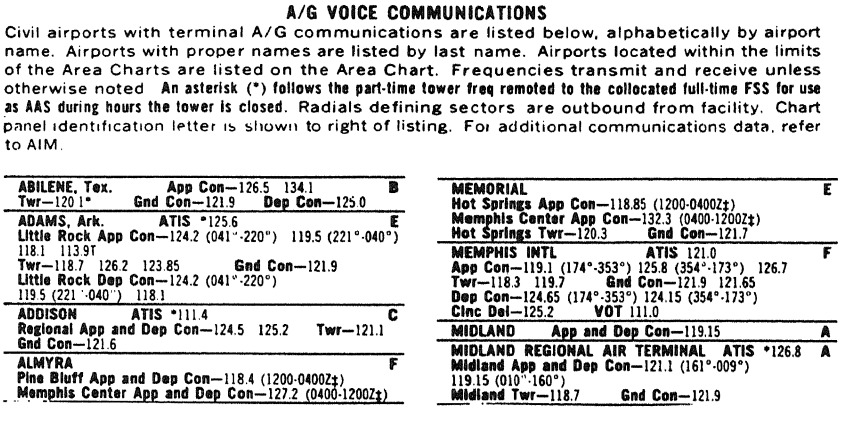
107

Below is an example of the front of an IFR low altitude chart. Enroute low altitude charts are used for IFR flights up to but not including flight level (FL) 180 (18,000 feet). Scan.



108

The low altitude charts have an alphabetical listing of all civil airports in the chart area, with the radio frequencies for each.



A/G VOICE COMMUNICATIONS

Civil airports with terminal A/G communications are listed below, alphabetically by airport name. Airports with proper names are listed by last name. Airports located within the limits of the Area Charts are listed on the Area Chart. Frequencies transmit and receive unless otherwise noted **An asterisk (*) follows the part-time tower freq remoted to the collocated full-time FSS for use as AAS during hours the tower is closed.** Radials defining sectors are outbound from facility. Chart panel identification letter is shown to right of listing. For additional communications data, refer to AIM.

ABILENE, Tex. App Con—126.5 134.1 B
Twr—120.1* Gnd Con—121.9 Dep Con—125.0

ADAMS, Ark. ATIS *125.6 E
Little Rock App Con—124.2 (041°-220°) 119.5 (221°-040°) 118.1 113.9T
Twr—118.7 126.2 123.85 Gnd Con—121.9
Little Rock Dep Con—124.2 (041°-220°) 119.5 (221°-040°) 118.1

ADDISON ATIS *111.4 C
Regional App and Dep Con—124.5 125.2 Twr—121.1
Gnd Con—121.6

ALMYRA F
Pine Bluff App and Dep Con—118.4 (1200-0400Z‡)
Memphis Center App and Dep Con—127.2 (0400-1200Z‡)

MEMORIAL E
Hot Springs App Con—118.85 (1200-0400Z‡)
Memphis Center App Con—132.3 (0400-1200Z‡)
Hot Springs Twr—120.3 Gnd Con—121.7

MEMPHIS INTL ATIS 121.0 F
App Con—119.1 (174°-353°) 125.8 (354°-173°) 126.7
Twr—118.3 119.7 Gnd Con—121.9 121.65
Dep Con—124.65 (174°-353°) 124.15 (354°-173°)
Clnc Del—125.2 VOT 111.0

MIDLAND App and Dep Con—119.15 A

MIDLAND REGIONAL AIR TERMINAL ATIS *126.8 A
Midland App and Dep Con—121.1 (161°-009°) 119.15 (010°-160°)
Midland Twr—118.7 Gnd Con—121.9

What is the radio frequency for Abilene Tower (Twr)?

.....

120.1

109

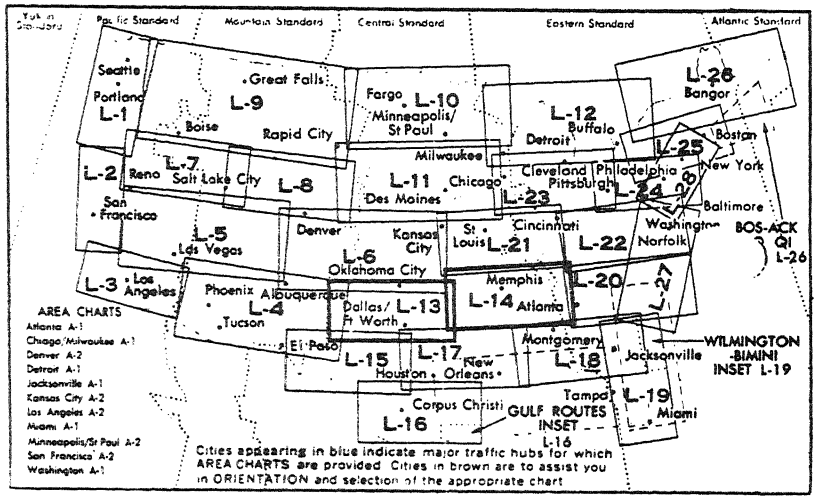
Low altitude charts are used for aircraft flying up to what altitude?

.....

Up to but not including FL 180.

110

Enroute low altitude charts are identified by the letter "L" followed by a number. The chart below is the L-13/L-14 chart, as indicated by the heavily-lined boxes.



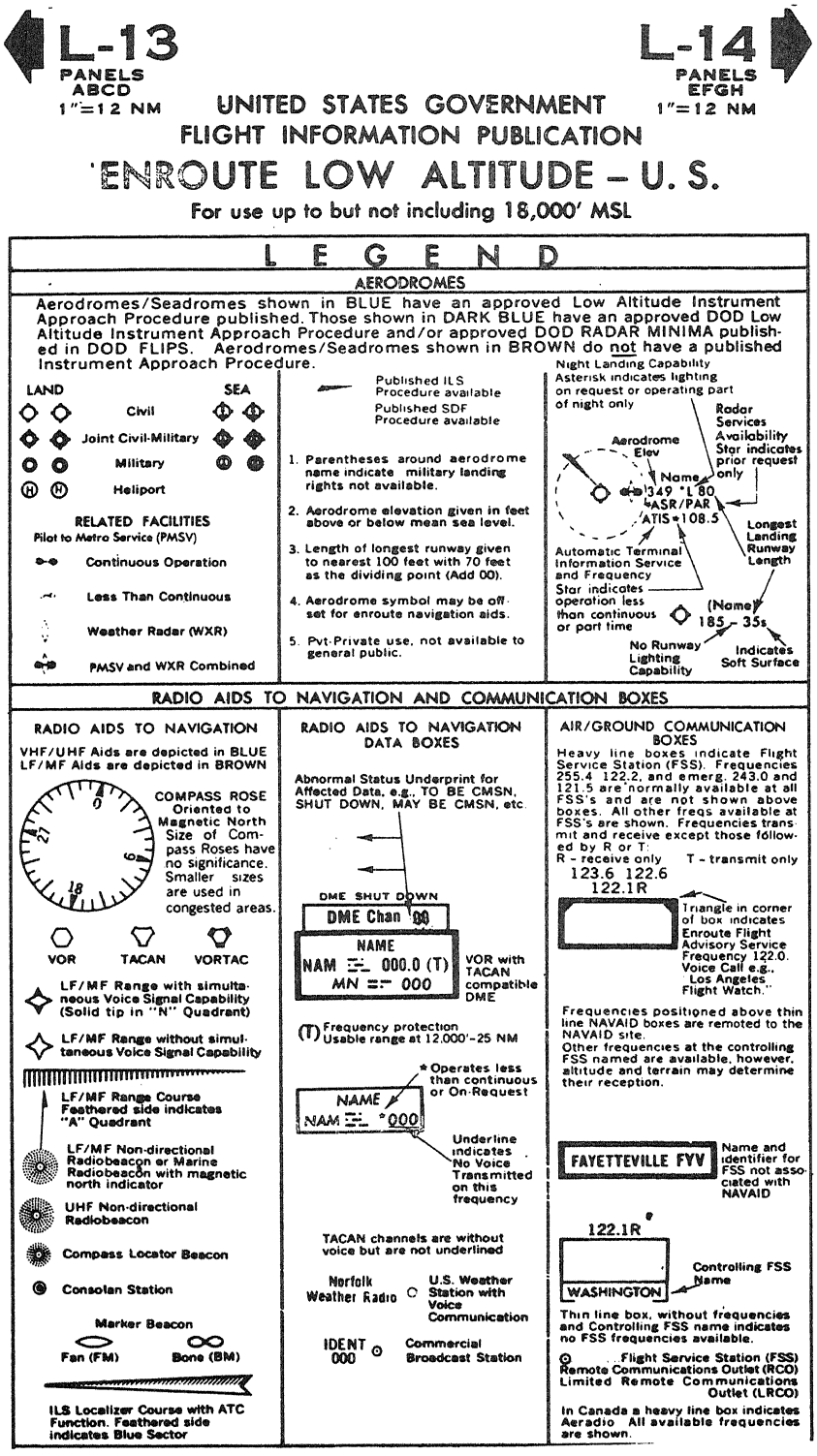
If a pilot wishes to fly IFR to Seattle, which low altitude chart would he need?

.....

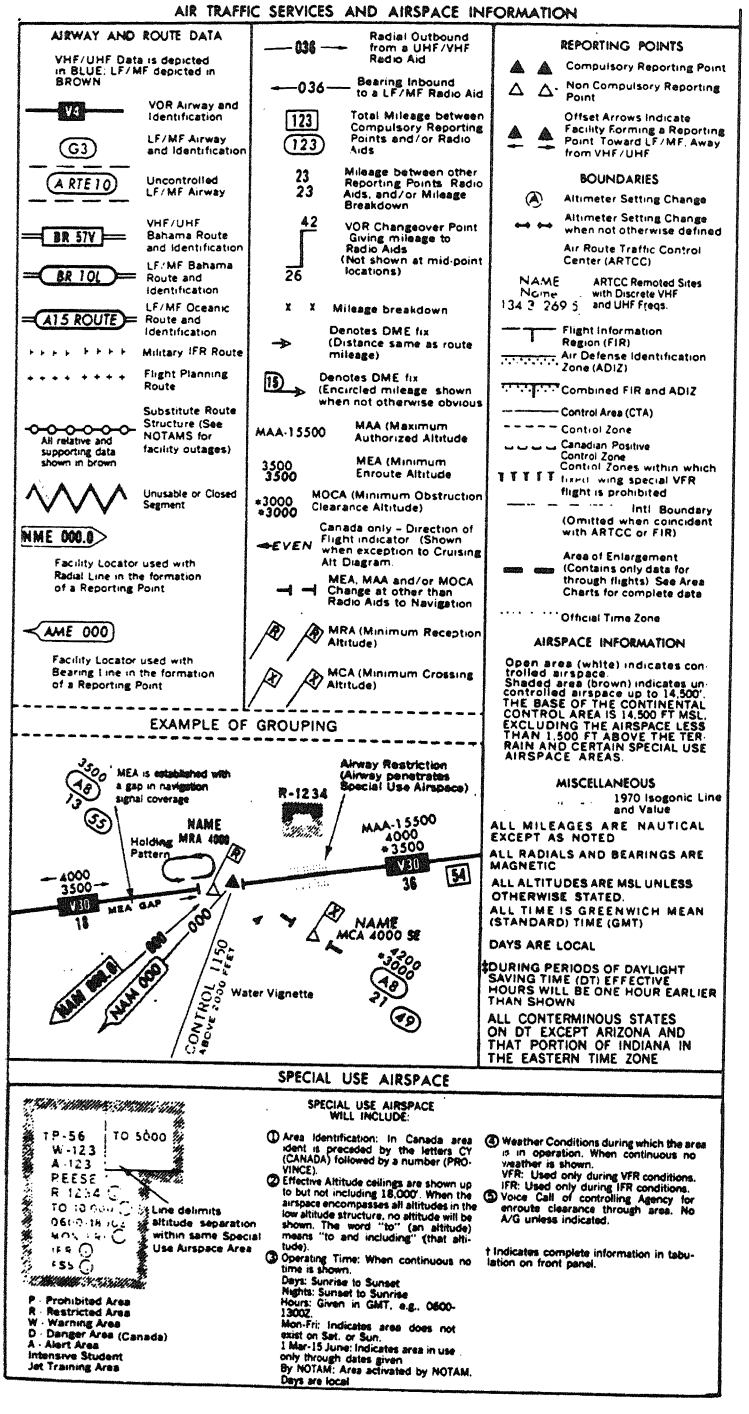
L-1

111

The following symbols are on the inside of a low altitude chart. Scan the legend on this page.



Low altitude chart (cont'd)



113

Why are highways and rivers not shown on charts used for IFR flights?

.....

When flying under IFR conditions, these landmarks may not be seen.

114

Which of the following can be found on an enroute low altitude chart? Refer to frames 111 and 112.

..... A. Aerodromes (airports)

..... B. Highways

..... C. Radio Aids to Navigation (VORs, TACAN and VORTACs)

..... D. Rivers

..... E. Airways and Route Data

A.

C.

E.

115

Study frame 111, then write the names of the three VHF/UHF radio aids which are used in navigation today.

.....

.....

.....

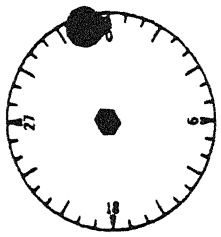
VOR

TACAN

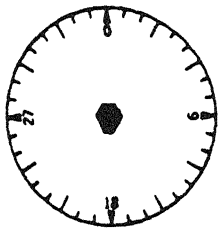
VORTAC

116

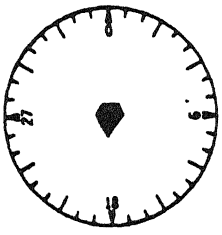
The following is a diagram of symbols used to identify these aids.



VOR



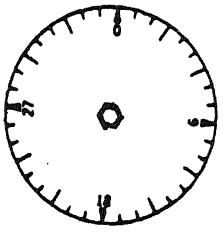
VORTAC



TACAN

117

What kind of navigational aid is shown below refer to frame 111.

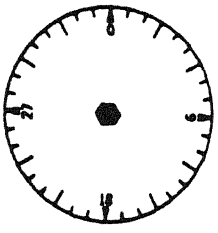


.....

VOR, (the hexagon figure (six sides) in the middle of the circle represents a VOR.)

118

Is the following VOR a compulsory or non-compulsory reporting point? Refer to frame 112, column 3.

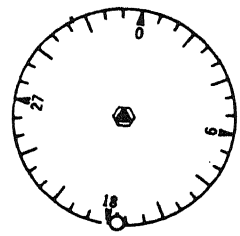


.....

Noncompulsory (the triangle inside the hexagon figure is white, not shaded).

119

Is the following VOR a compulsory or noncompulsory reporting point? Refer to frame 112, column 3.

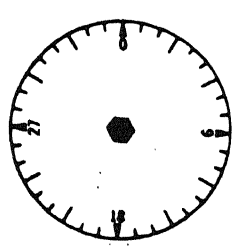


.....

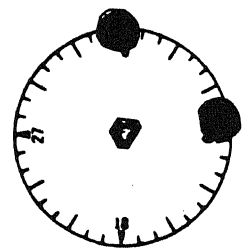
Compulsory (the shaded triangle represents a compulsory reporting point).

120

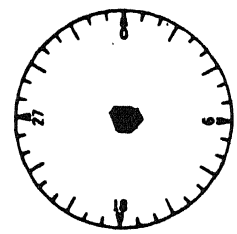
Which of the following navigational aids is a VORTAC? Refer to frame 111.



A.



B.



C.

.....

C.

121

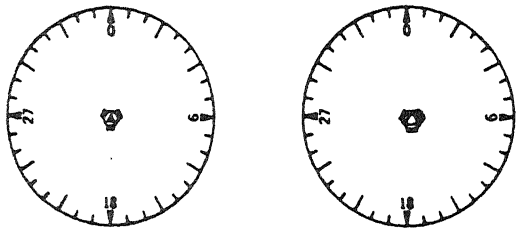
How many radio beacons are there in frame 120?

.....

Two, in figure B.

122

Which of the following VORTACs is a noncompulsory reporting point?



A. B.

.....

B

123

Refer to frame 112, The Air Traffic Services and Airspace Information portionof the legend, and write the name of the VOR airway listed under airway and route data.

.....

V4 (Victor Four)

124

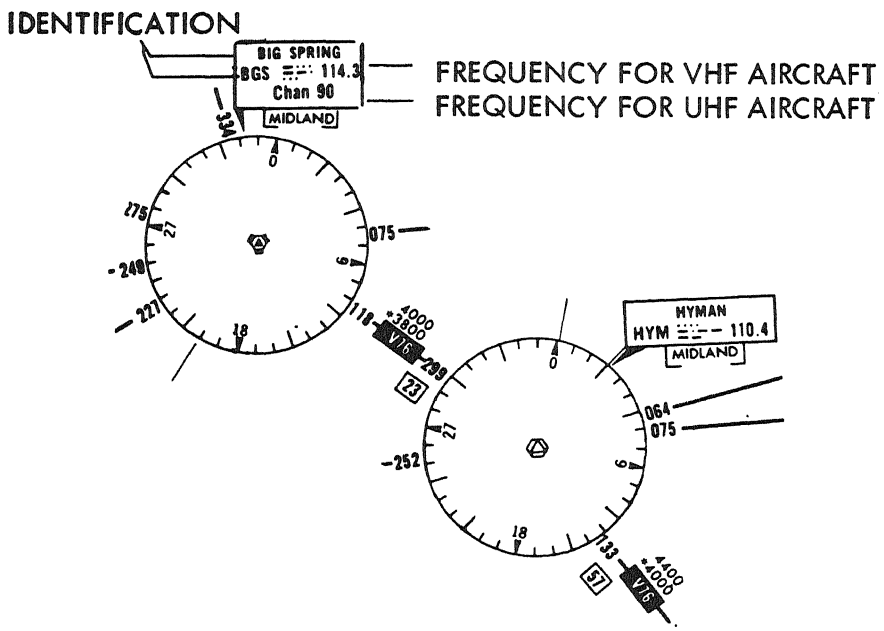
Refer to frame 112, column 2. What is the MEA?

.....

3500 - MEA

125

VOR airways are predicated solely on VOR/VORTAC navigation aids. Any radial may be used to make up an airway. VOR airways are identified on aeronautical charts by a "V" followed by a number. See example below:



The data box above the Big Spring VORTAC contains information concerning this aid: (1) identification - Big Spring (three letter code - BGS), (2) VOR frequency for VHF aircraft - 114.3, (3) and the VORTAC frequency for UHF aircraft - channel 90.

126

What is the airway number and total mileage between Big Springs and Hyman? Refer to frame 125.

.....

.....

V76

|23|

127

What radials make up V76 between Big Springs and Hyman VOR? Ref to frame 125.

.....

.....

Big Springs 118 radial

Hyman 299 radial

128

What is the identifier of the Hyman VOR and its frequency? Refer to frame 125.

.....

.....

HYM

110.4

129

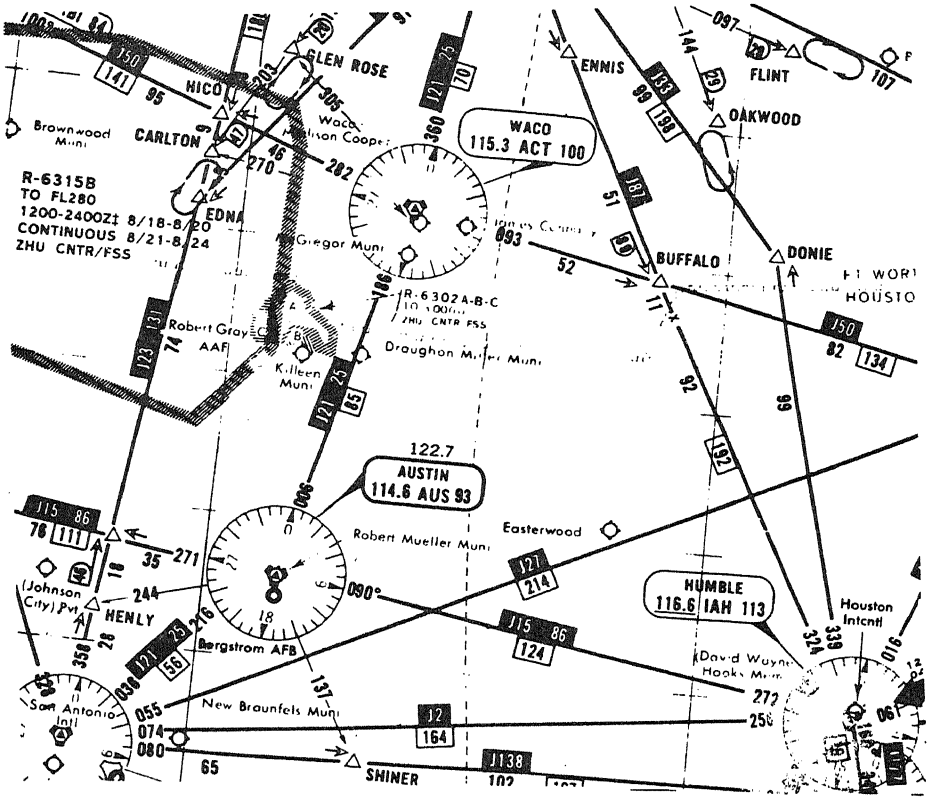
What is the MEA between BGS and HYM? Refer to frame 125.

.....

4000

130

Enroute high altitude charts are used to fly from FL 180 up to FL 450. Only radials from VORTACs are used to establish jet routes. These routes are identified on an aeronautical chart by a "J" followed by a number. Some airways and jet route segments have more than one number assigned to them.



What are the numbers of the jet routes between ACT and AUS?

.....

J21 and J25

131

Jet routes are used between what altitudes?

.....

FL 180 to FL 450

132

What are the identifications of the VORTACs depicted in frame 130?

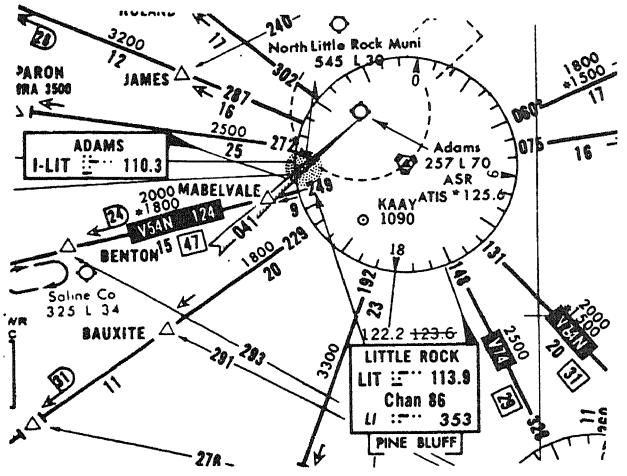
.....

Waco (ACT), Austin (AUS), and Humble (IAH), Texas. All navigational aids depicted on a high altitude chart are VORTACs.

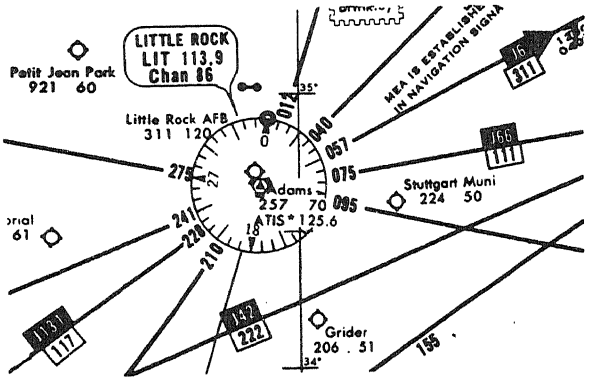
133

Identify the following two charts.

A.



B.



..... A.

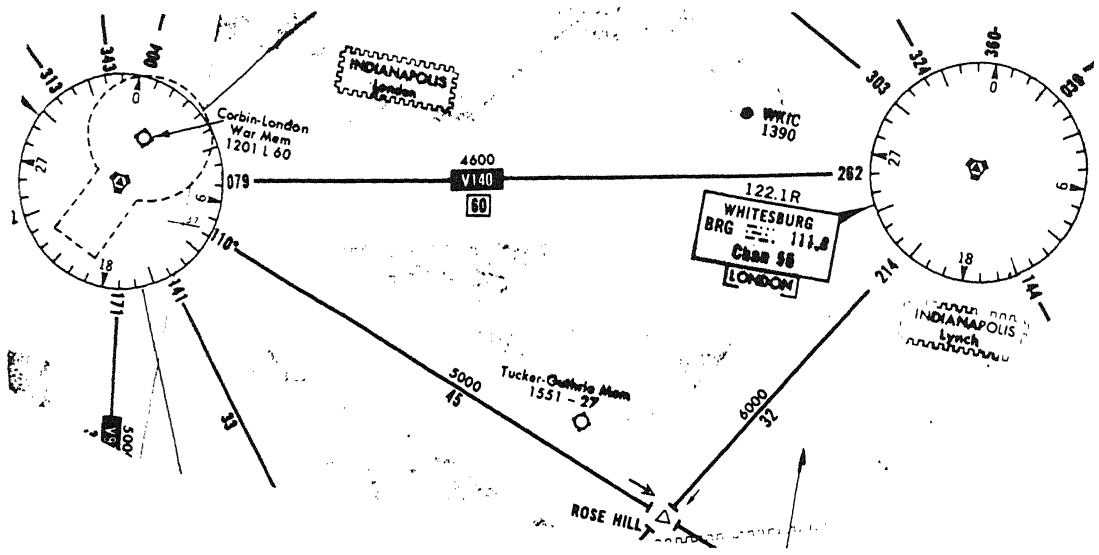
..... B.

Enroute low altitude A.

Enroute high altitude B.

134

Uncontrolled airspace is depicted as a shaded area on enroute low altitude charts.



Refer to the above illustration. Is radio station WKIC located in controlled or uncontrolled airspace?

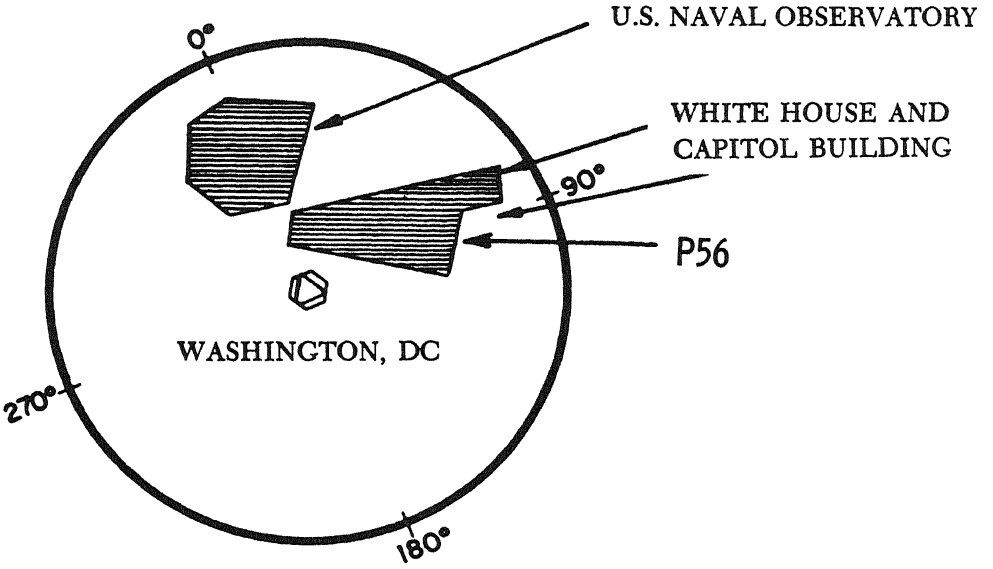
..... A. Controlled.

..... B. Uncontrolled.

B.

135

There are prohibited, restricted, and warning areas established and charted to further aviation safety. These areas are indicated on aeronautical charts. Air traffic for all practical purposes is not permitted in a prohibited area. A letter "P" followed by a number identifies prohibited areas.



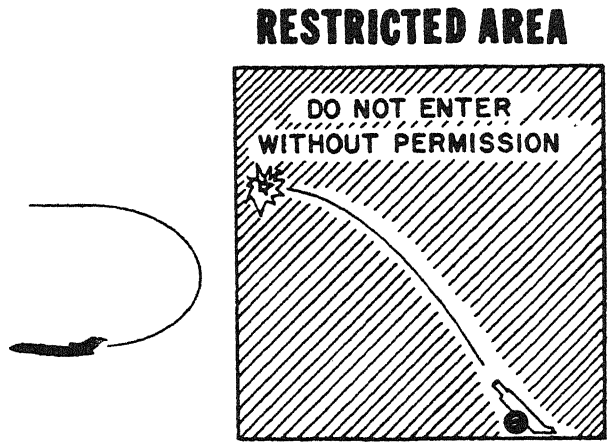
In regard to a prohibited area, a pilot must do what, when planning his flight plan?

.....

Remain clear of all prohibited areas.

136

A restricted area is an airspace of defined dimensions on the surface of the earth where activities of a hazardous nature take place. No person may operate an aircraft within these areas without prior permission from the controlling agency. These areas, such as aerial gunnery and bombing ranges, are indicated on a char by the letter "R", followed by a number. See example below:



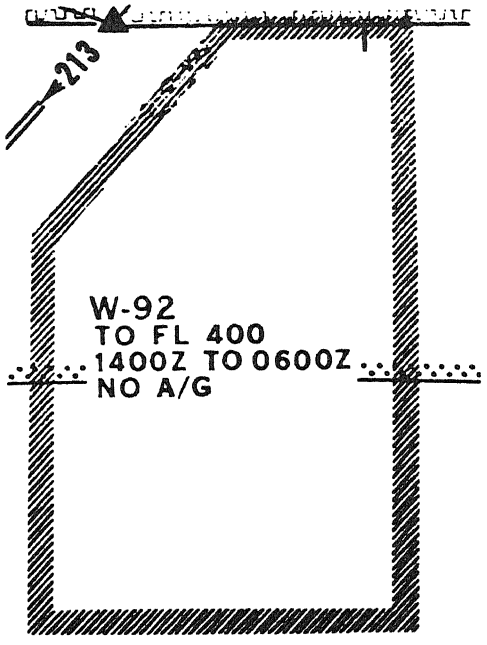
Who has the authority to grant permission to fly through a restricted area?

.....

The controlling agency.

137

A warning area is established to inform pilots that activities may be in progress which require them to be constantly alert. Aircraft operating in a warning area are not being controlled by any agency. These areas are indicated on the chart by a letter "W" followed by a number. See example below:



What is the identification of the warning area pictured above?

.....

W-92

138

Match the following areas with the letter as they are indicated on an aeronautical chart.

..... A. Warning Area

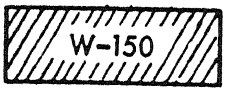
..... B. Prohibited Area

..... C. Restricted Area

A

B

C



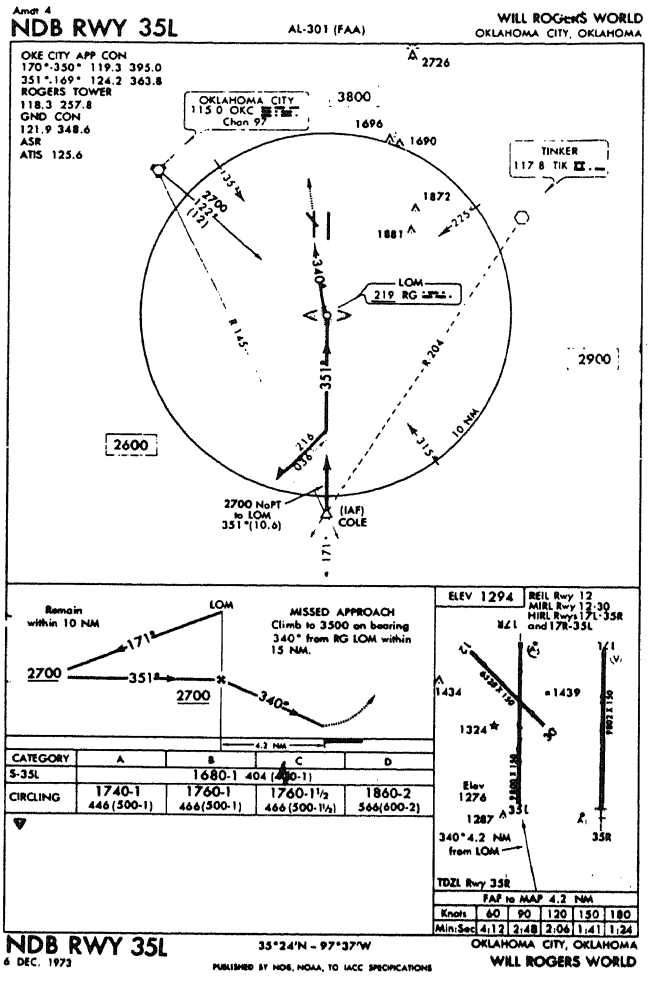
C A.

A B.

B C.

139

Approach and Landing (AL) Charts specify details of the procedures to be used in making an instrument approach under IFR conditions. See example below:



Among the information shown in a detailed sketch of the approach (located in the middle of the circle), airport (located in the lower right hand corner), and frequencies which are available (located in the upper left hand corner).

140

How many frequencies are there available to call Oklahoma City Approach Control? Refer to frame 139.

.....

Four

141

What is the name of the airport at Oklahoma City, Oklahoma? Refer to frame 139.

.....

Will Rogers World

142

The Office of Aeronautical Charting and Photography has the responsibility to draw and print aeronautical maps and charts according to FAA specifications. These aeronautical maps and charts are updated periodically and are distributed nationwide. The remaining components of NOAA are: Environmental Data Services, National Environmental Satellite Service, and Environmental Research Laboratories. Each in its way supports the aviation industry.

Who prepares the FAA aeronautical maps and charts?

.....

Office of Aeronautical Charting and Photography

143

How does the agency obtain its supply of updated aeronautical maps and charts?

.....

They are automatically distributed.

144

These charts are always available to the controller. During your career with the FAA, you will be called upon to read these charts. If you do not know what a symbol or letter means when reading a chart, look it up. A pilot's life may depend on it.

SECTION 5

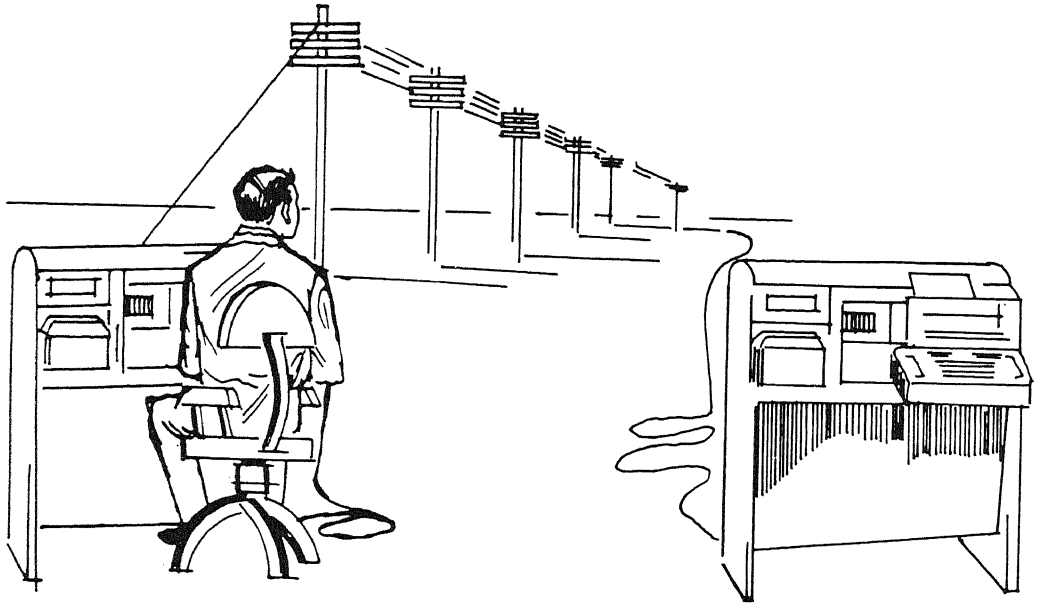
TELECOMMUNICATIONS SYSTEMS

145

A method is needed for the rapid dissemination of information vital to the air traffic system. There are several methods used, some of which will be discussed in this section.

146

The FAA has a teletypewriter system which is used as a method for the exchange of messages. These teletypewriter messages contain information of importance to the Air Traffic Control Specialist.



SEND AND RECEIVE

SEND AND RECEIVE

TELETYPEWRITER SYSTEM

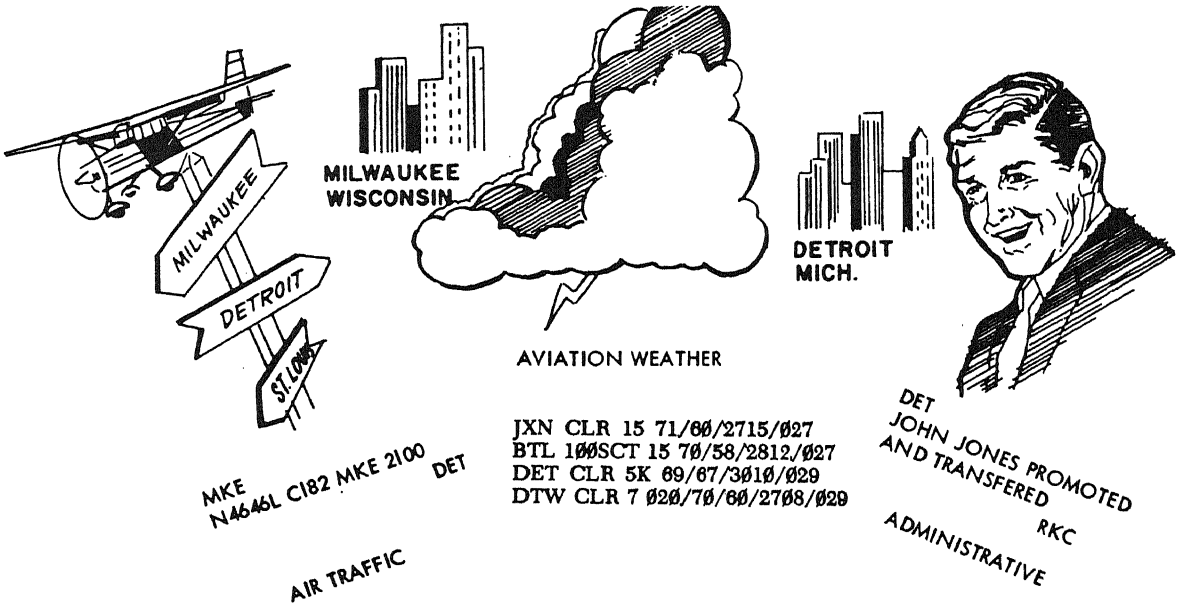
Radio and telephones are means of exchanging comunication messages. What other system does the Air Traffic Control Specialist use to exchange information?

.....

The teletypewriter system

147

The illustration below indicates the types of information transmitted over the teletypewriter system.



Which of the following types of information are transmitted on FAA teletypewriter systems?

..... A. Severe weather conditions between Milwaukee, Wisconsin and Detroit, Michigan.

..... B. Information concerning an Air Traffic Control Specialist's promotion and transfer.

..... C. A flight plan message on an aircraft flying between Detroit, Michigan and Milwaukee, Wisconsin.

A.

B.

C.

148

Refer to the question in frame 145, classify the types of messages as weather, air traffic, or administrative.

..... A.

..... B.

..... C.

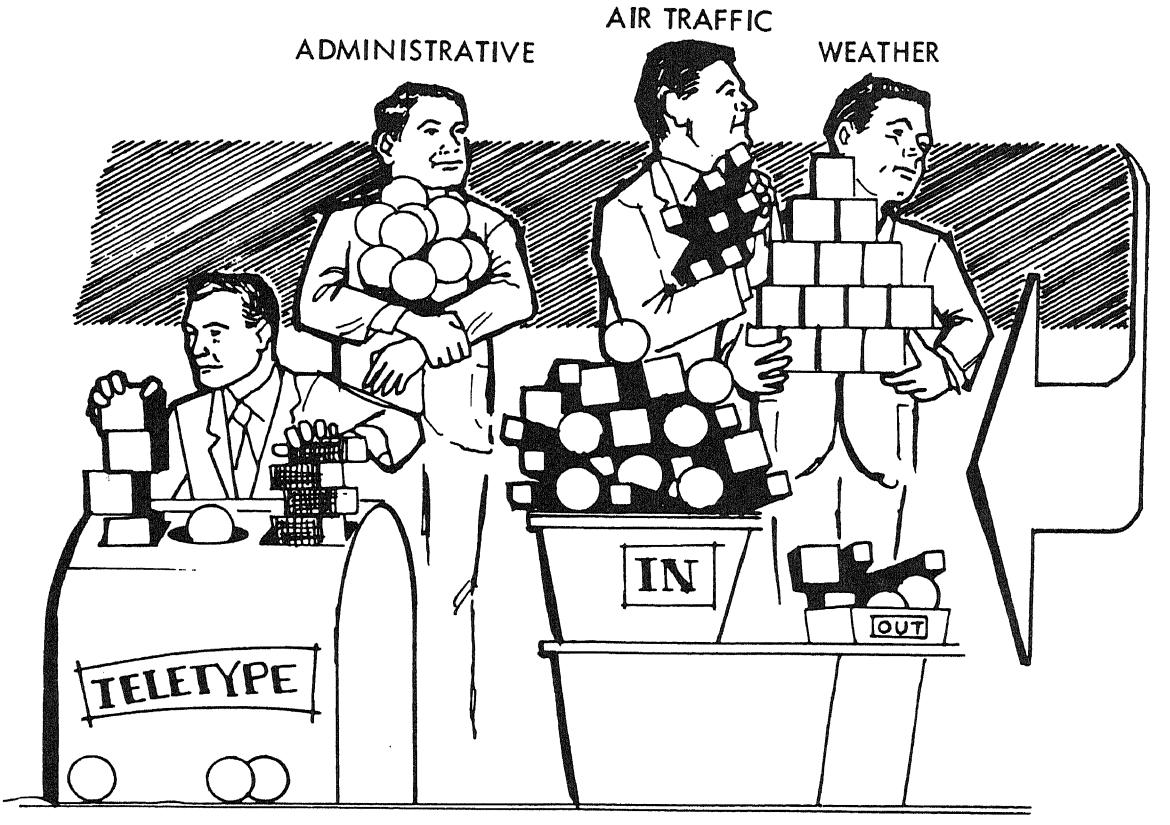
Weather A.

Administrative B.

Air traffic C.

149

There is a large volume of teletypewriter messages generated in the Air Traffic Control System. The teletypewriter system would be overloaded if there were only one teletypewriter line to transmit and receive this volume.

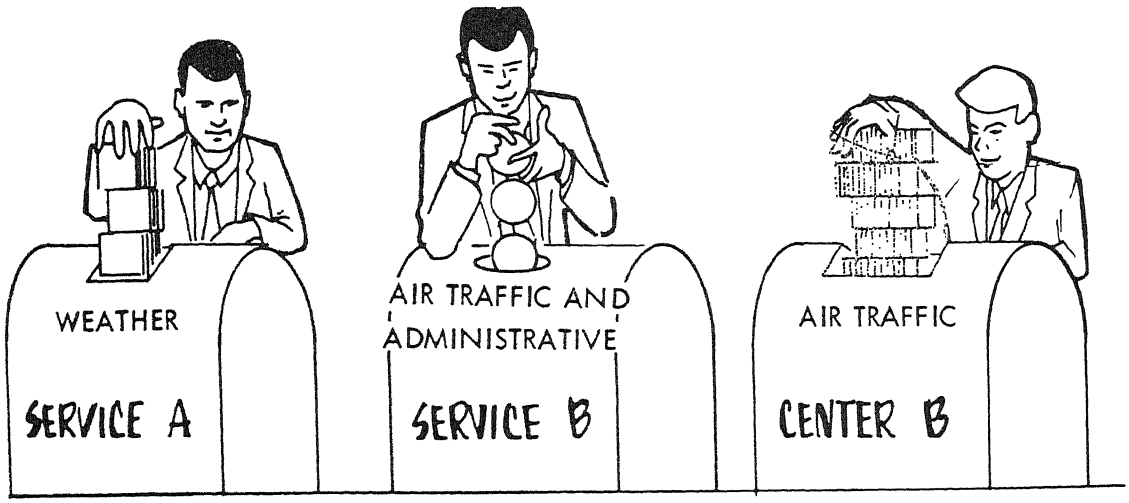


What would you do to eliminate the bottleneck in the above illustration?

You may decide to use two or more teletypewriter lines to speed up the communication process by separating the different types of messages.

150

The FAA eliminated the bottleneck by developing separate teletypewriter networks.



Why is the system in the above illustration better than the system shown in frame 149?

The messages are separated by types and each type is transmitted over a different teletypewriter network.

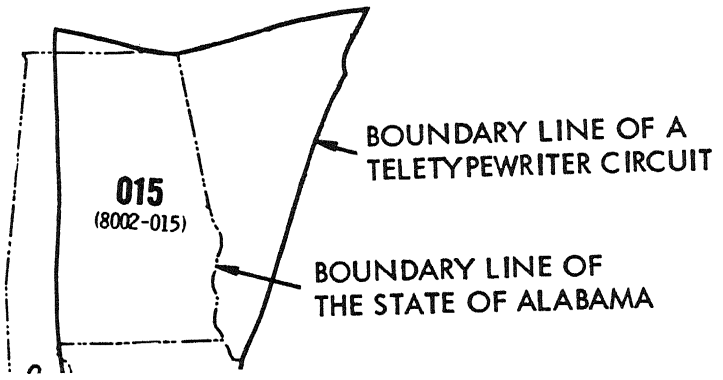
151

Why is there more than one teletypewriter system?

To reduce the volume of messages transmitted on one teletypewriter network and to provide separate networks for different types of messages.

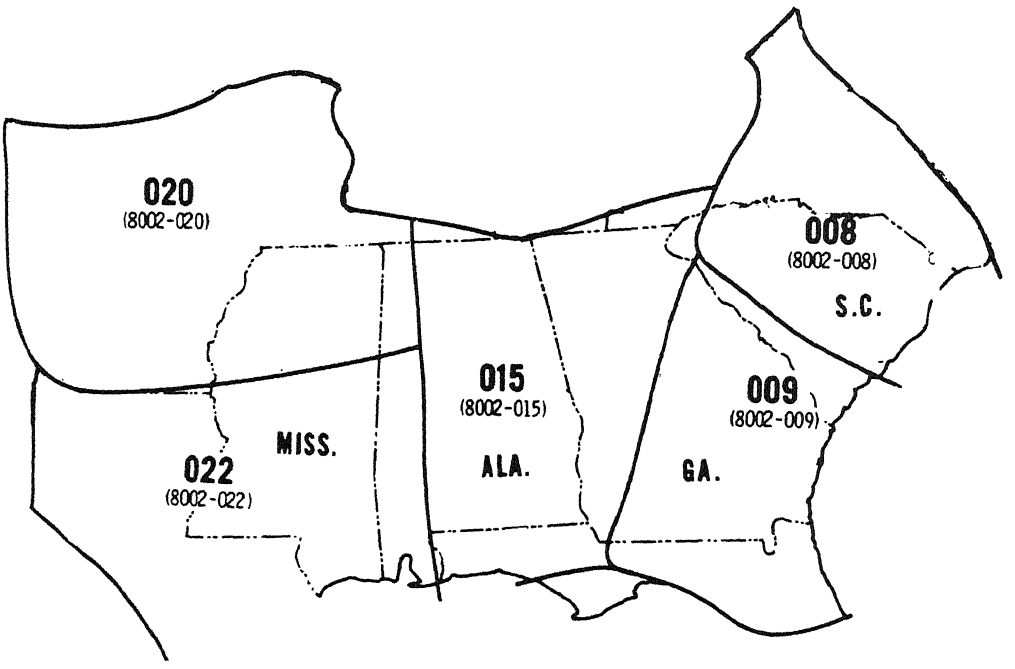
152

A basic part of the teletypewriter network is the circuit, which is identified by number. See illustration below:



153

Many states make up the United States of America, likewise many teletypewriter circuits make up a teletypewriter network.



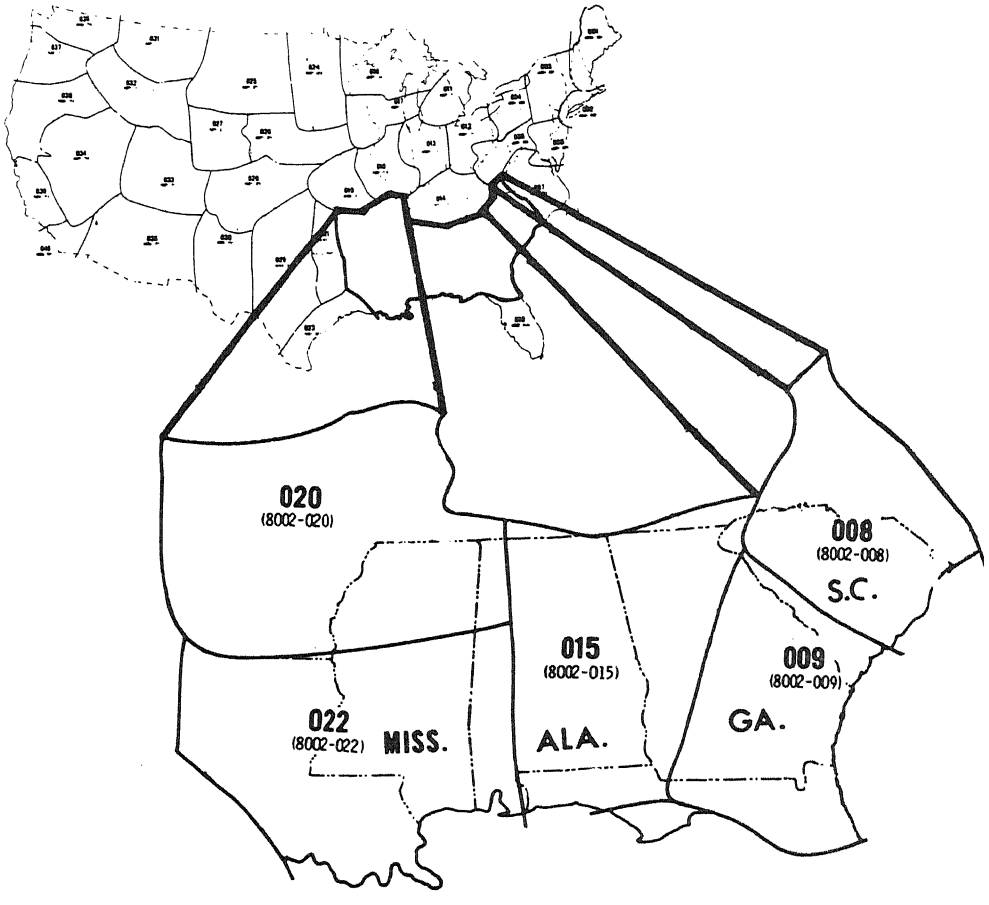
States are common to the United States of America. What is comm to a teletypewriter network?

.....

Teletypewriter circuits.

---

154 Illustrated below is the Service A weather network with five circuits enlarged.



The general boundary of the United States makes up the Service A network. What five circuits are identified in the above illustration?

....

....

.....

---

008 020

009 022

015

155

Two or more circuits send-receive stations which exchange the sar type of messages make up a network.

156

What type of messages are transmitted on the Service A network?

.....

Weather

157

List the three types of messages exchanged on teletypewriter networks.

.....

.....

.....

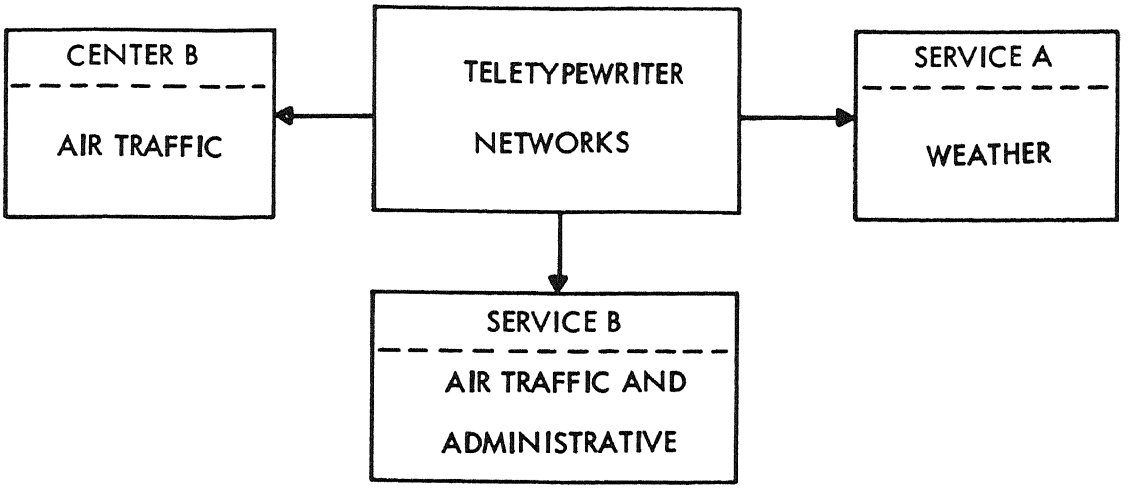
Air Traffic Control

Weather

Administrative

158

Illustrated below are three teletypewriter networks and the types of messages sent and received by air traffic facilities.



On which network would the following messages be sent?

..... A. Information concerning employee pay increases.

..... B. Clear weather between St. Louis, Missouri and Oklahoma City, Oklahoma.

..... C. A movement and control message on an aircraft flying IFR between Tulsa, Oklahoma and Dallas, Texas.

Service B A.

Service A B.

Center B C.

159

Why would you use separate networks to send different types of messages?

The large volume of messages could not be serviced by one network.

160

Refer to frame 158 and identify the three basic teletypewriter networks and their function.

.....

.....

.....

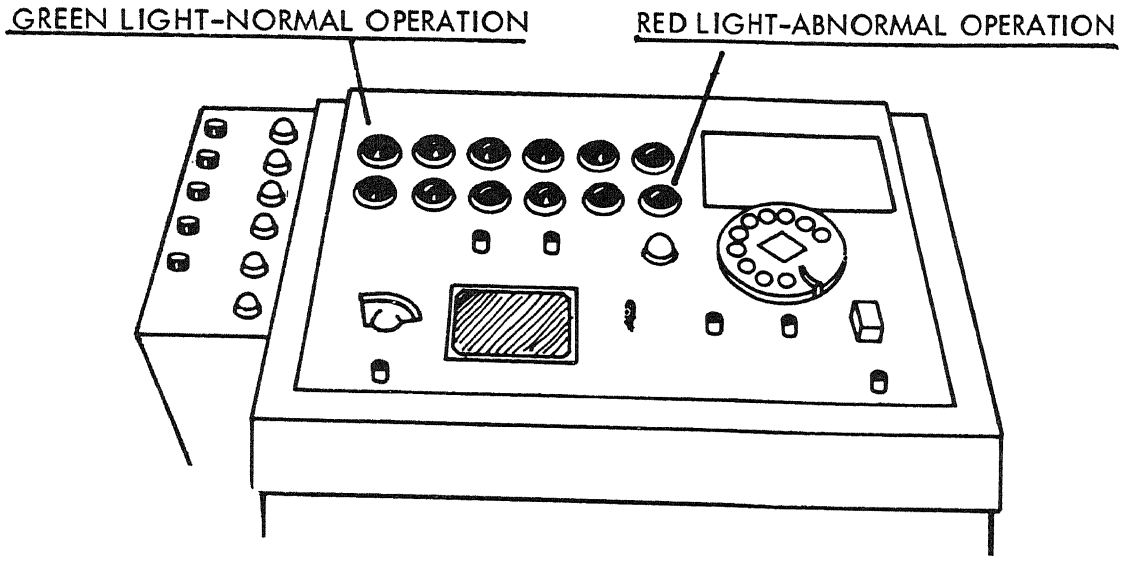
Center B - Air Traffic

Service A - Weather

Service B - Air Traffic and Administrative

161

Navigational and teletypewriter equipment have monitoring systems which alert the specialist when equipment is not operating properly.



Each monitoring system may be somewhat different. The monitor illustrated above is one type. What would you visually observe that indicates something is wrong?

.....

A red light.

162

What indicates that the equipment is operating normally? Refer to frame 161.

.....

A green light.

163

In addition to the red light, a bell or buzzer sounds when any part of the equipment has failed. This feature was designed to alert the specialist when he is working in an area away from the monitoring system. When you hear a bell or buzzer from the monitor equipment, what has happened?

.....

A piece of equipment has failed.

164

What methods are used to alert the specialist of a malfunctioning piece of equipment?

..... A.

..... B.

..... C.

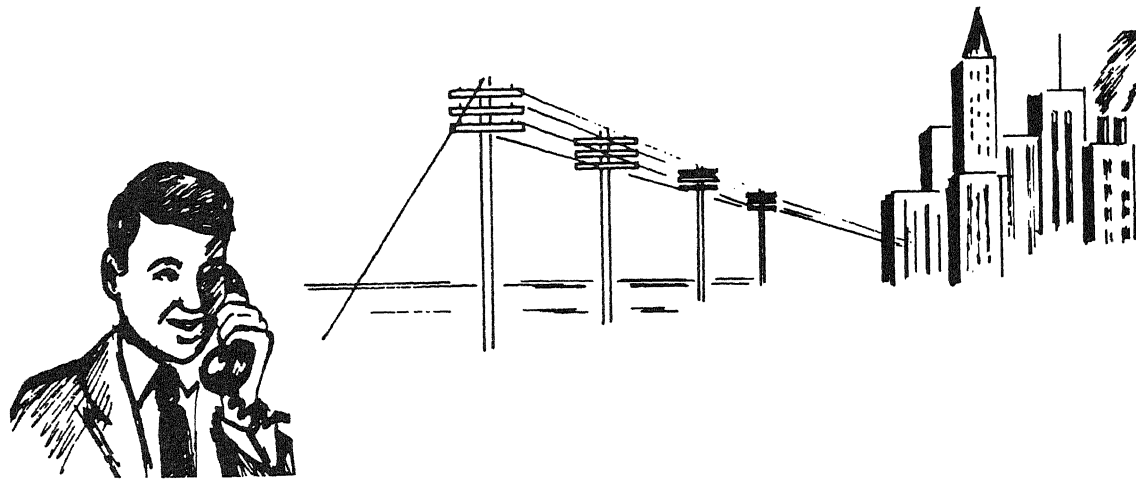
Red light A.
.....

Bell B.
.....

Buzzer C.
.....

165

The services performed by the FAA rely on an extensive telephone communications network. There are two primary telephone systems used in FAA facilities; the standard or commercial telephone whic the public may use to contact FAA facilities, and an extensive private system which is an interphone network commonly referred t as Service F.



166

What is the name of the extensive private interphone network used by FAA?

.....

Service F

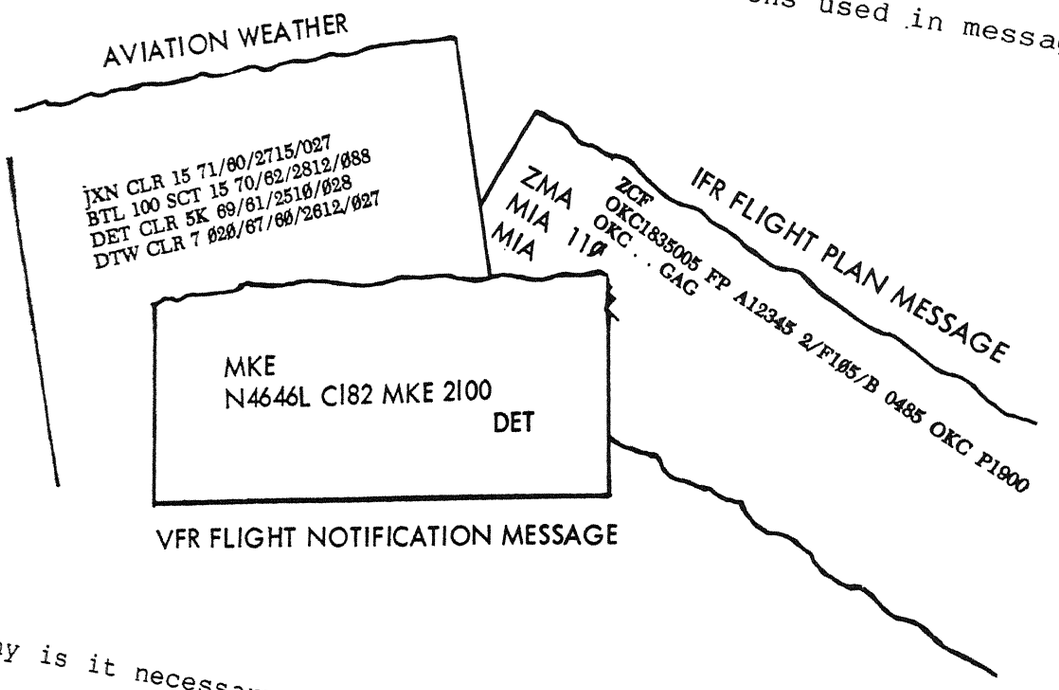
SECTION 6

PHRASEOLOGY AND CONTRACTIONS

167

Phraseology and contractions are a form of shorthand used by the Air Traffic Control Specialist to form words, letters, and phrases. The following section provides examples of this shorthand and explains why it is used in FAA communications.

The following are examples of contractions used in messages.



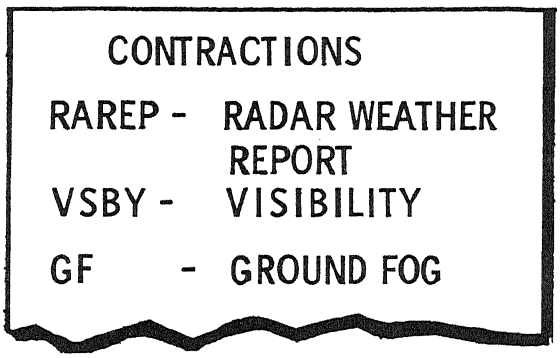
Why is it necessary to use phraseology and contractions?

.....

To shorten messages.

169

Contractions are used in many different types of teletypewriter messages and radio transmissions. Some examples are shown below.

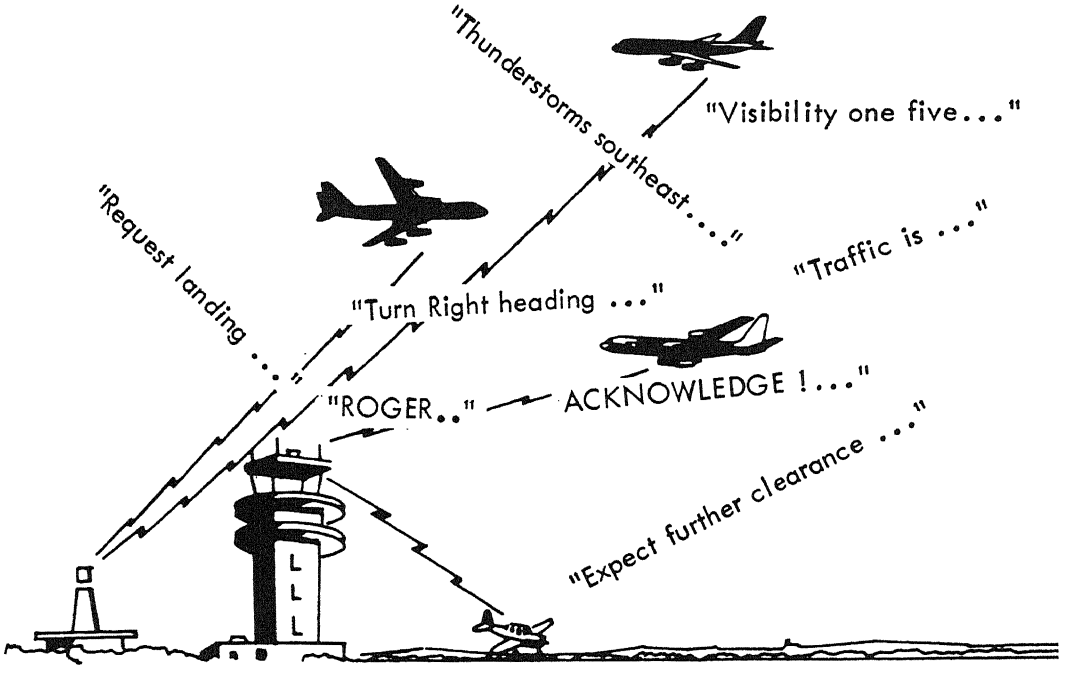


What is the contraction for radar weather report?

.....

RAREP

There are prescribed procedures and phraseology that the Air Traffic Control Specialist uses to communicate with other specialists and pilots. This eliminates confusion, and insures that specialists and pilots interpret messages in the same manner.



What would happen if all of the above communications were given without following prescribed procedures?

.....

Confusion

171

Standard phraseology eliminates confusion and error in communications. This is true whether communicating with aircraft or other air traffic facilities. Look at this illustration.

"N1234, TURN RIGHT HEADING ONE EIGHT ZERO"

What would you expect N1234 to do if the specialist used standard phraseology as illustrated above?

.....

Turn right to a heading of 180°

172

Why was the previous transmission successful?

.....

The specialist used standard phraseology.

173

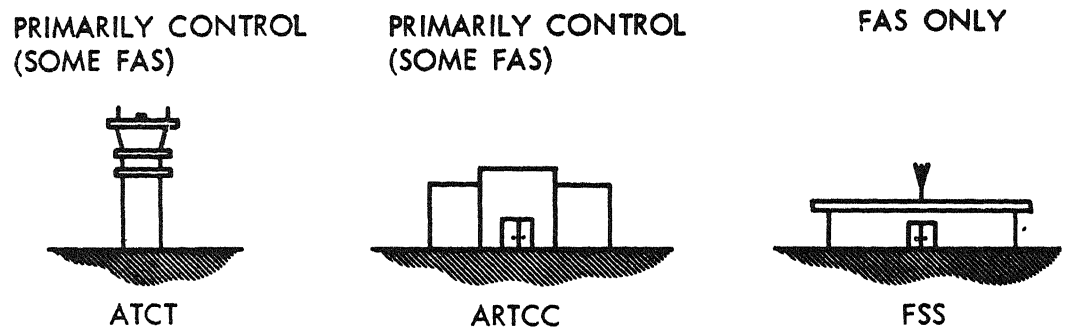
What does standard phraseology do to improve communications?

.....

Eliminates error and confusion.

177

Flight Assistance Service (FAS) is furnished for all categories of aircraft by specialists in Airport Traffic Control Towers (ATCT), Air Route Traffic Control Centers (ARTCC), and Flight Service Stations (FSS).



Which facility provides only Flight Assistance Service?

.....

FSS

178

What is the function of a Flight Service Station?

.....

Provide Flight Assistance Service

179

What is another duty of ATCTs and ARTCCs in addition to their primary duty of controlling air traffic?

.....

Provide Flight Assistance Service

180

Flight Assistance Service covers many types of service. One of these services is providing assistance to aircraft in flight. Look at the illustration below.

If a pilot is disoriented, what facilities may he contact for assistance?

.....

.....

.....

FSS

ATCT

ARTCC

181

FSS personnel must be completely familiar with the topographical features of the terrain within a 100-mile radius of their facility. If a pilot is lost within this area and can see the ground without difficulty, what would the FSS specialist most likely ask him to do?

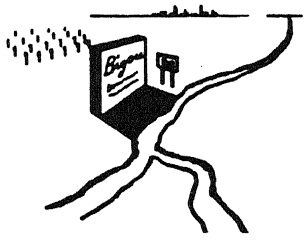
.....

Describe the terrain.

182

Assume that the pilot responds in the following manner.

"I SEE A DRIVE-IN MOVIE AND THE JUNCTION OF THE TWO RIVERS. CAN YOU TELL ME WHERE I AM?"



What kind of information can the specialist give the pilot after receiving this report?

.....

His position.

183

All air traffic facilities use radio for the exchange of information. Name these facilities.

.....

.....

.....

ATCT

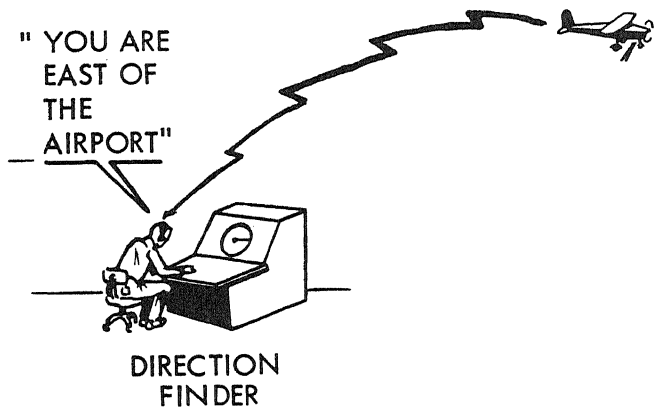
ARTCC

FSS

184

The specialist has other equipment to use in assisting aircraft. Direction finder equipment gives the direction of an aircraft from an airport.

DIRECTION FINDER (DF)



Name the equipment which determines the direction of an aircraft from an airport.

.....

DF

185

When using DF to orient a lost pilot, the specialist will be able to tell the pilot his direction from what central point?

.....

An airport.

186

Direction finder equipment does not give distance informatio
However, the illustration below shows equipment which does g
distance information.

What kind of facility equipment does give distance informati

.....

Radar

187

Radar assists specialists in determining the position of an a
craft by providing what two kinds of information?

.....

.....

Distance

Direction

188

Radar is used chiefly for controlling traffic; it is also used in assisting aircraft.

Name the facilities which use radar to control air traffic.

.....

.....

ATCT

ARTCC

189

Which Air Traffic Facilities provide inflight assistance?

.....

.....

.....

ARTCC

ATCT

FSS

190

What three types of equipment can be used to assist aircraft?

.....

.....

.....

Radio

Direction finding

Radar

191

Inflight assistance is needed when pilots encounter sudden, unexpected occurrences. Five kinds of emergencies are pictured.

MATCH THE FOLLOWING:

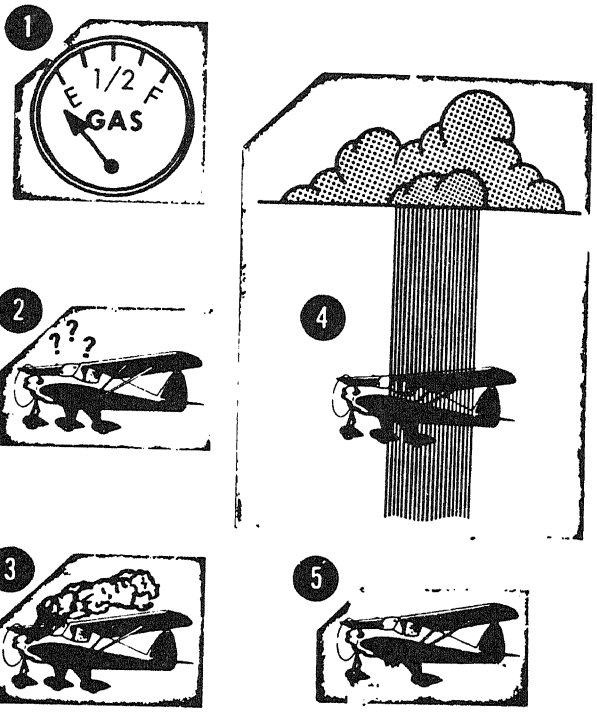
a. Equipment _____

b. Fire _____

c. Weather _____

d. Lost _____

e. Fuel _____



---

a. 5

b. 3

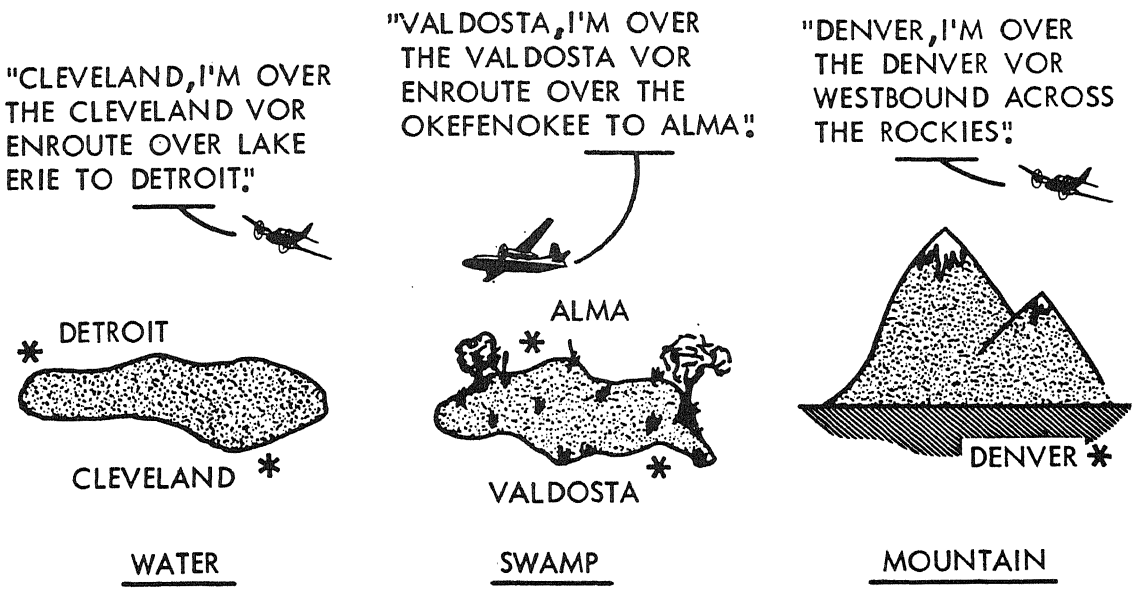
c. 4

d. 2

e. 1

192

Specialists provide flight monitoring service for aircraft flying over hazardous areas.



The pilot could request that his flight be monitored while flying over the types of areas pictured above. What three kinds of areas are pictured above?

.....

.....

.....

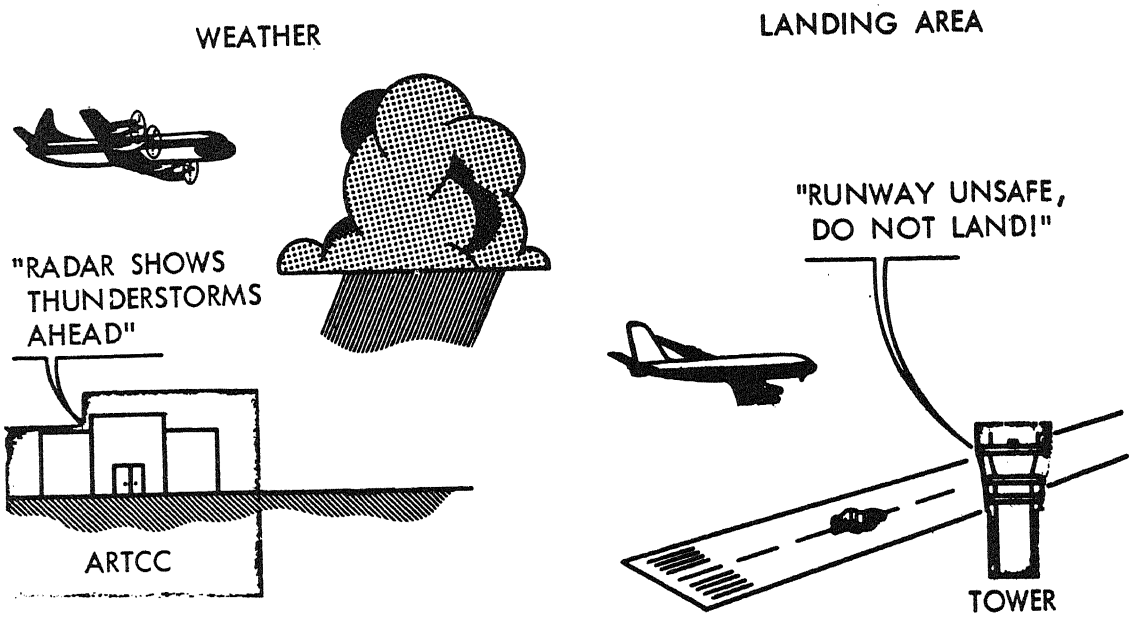
Water

Swamp

Mountain

193

Air traffic facilities issue advisories and information to assis pilots in conducting safe flight.



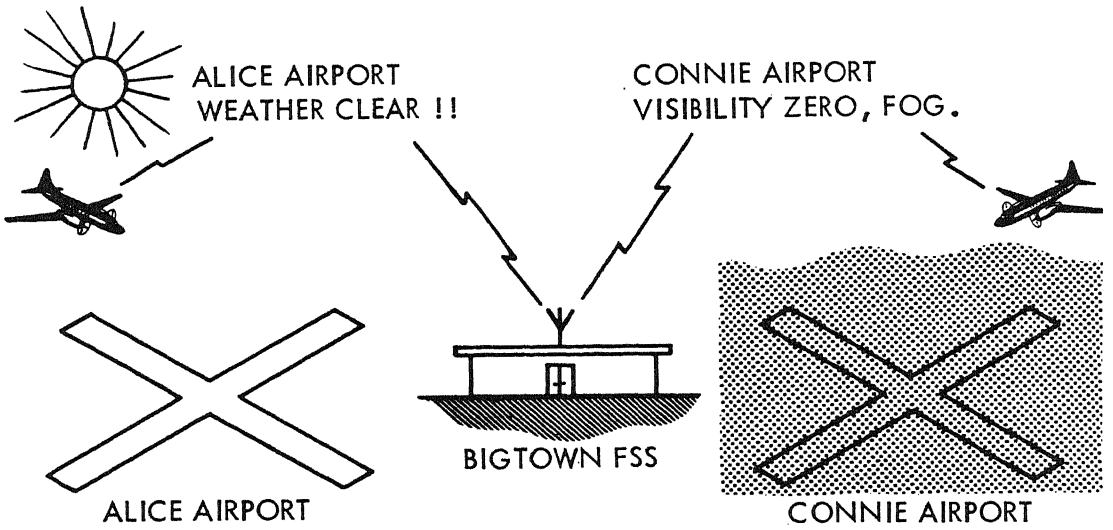
Why is the ARTCC issuing an advisory to the aircraft in the abov illustration?

.....

To warn the pilot of thunderstorms.

194

Normally, information transmitted by specialists is directed to a specific aircraft, and the pilot is expected to acknowledge. A radio broadcast, however, is a transmission to all pilots at the same time. Pilots are not required to acknowledge this type of transmission. Scheduled and unscheduled aviation weather broadcasts are examples.

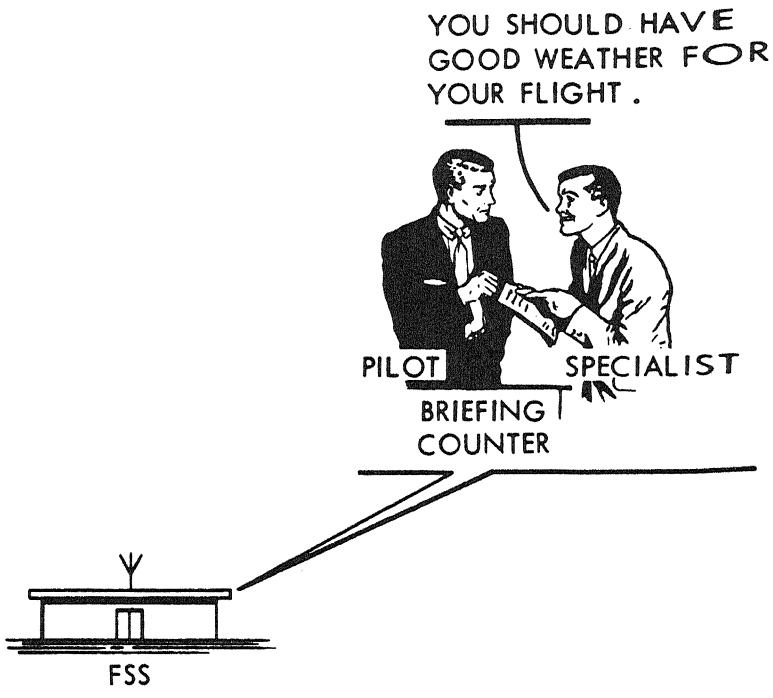


What air traffic transmission requires no acknowledgement?

Radio broadcast

195

Pilots can receive complete face to face preflight information from Flight Service Specialists.

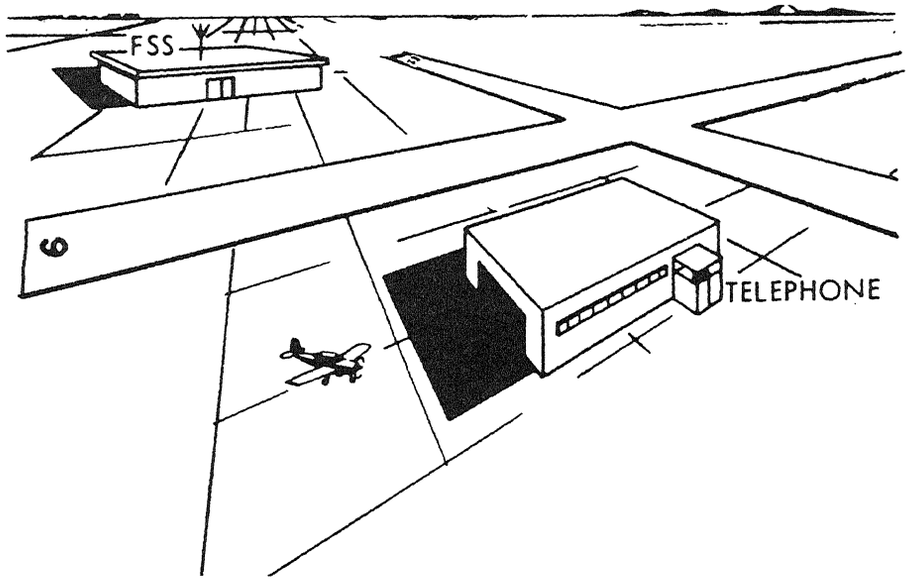


Which air traffic facility gives face-to-face preflight information?

Flight Service Station

196

Some pilots may not be able to visit the Flight Service Station for a face-to-face preflight briefing. Assuming the pilot is at the location shown below:



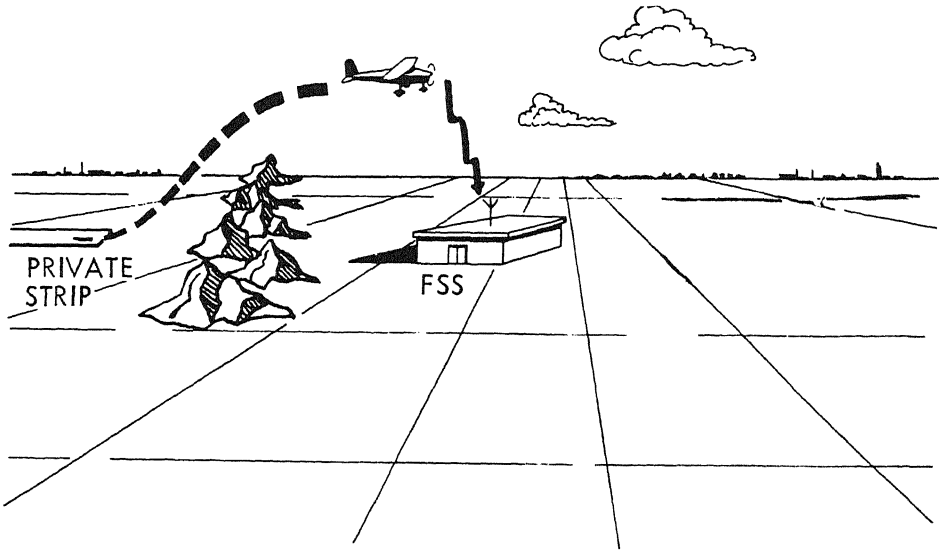
He cannot visit the FSS to get preflight information. How can he obtain a weather briefing?

.....

Telephone

197

In the illustration below the pilot was unable to obtain a pre-flight briefing.



What method of communication is the pilot using to obtain flight information?

.....

Radio

198

Name three methods by which a pilot can obtain preflight service

.....

.....

.....

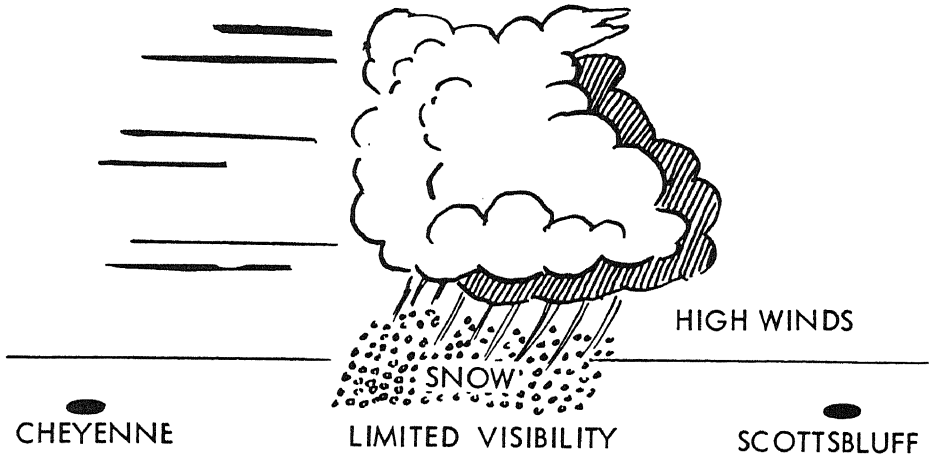
Face-to-face (walk-in)

Telephone

Radio

199

FSS specialists are trained to make recommendations concerning the advisability of flight based on information at their disposal. You are briefing a non-instrument rated pilot who plans to fly from Cheyenne, Wyoming, to Scottsbluff, Nebraska. The flight cannot be conducted without encountering IFR conditions.



What is your recommendation to this pilot?

.....

VFR not recommended (VNR)

200

In addition to weather information FSS specialists provide pertinent aeronautical information.

What aeronautical information would be helpful to the pilot before takeoff?

.....

Destination airport runway closed.

Classify the following types of information as:

W = Weather

or

AI = Aeronautical Information

..... A. Thunderstorm in vicinity of destination.

..... B. Air show in progress at destination.

..... C. Radio ranges are all operative.

..... D. Clear weather en route to destination.

..... E. Runway closed.

..... F. Visibility zero - fog.

W A.

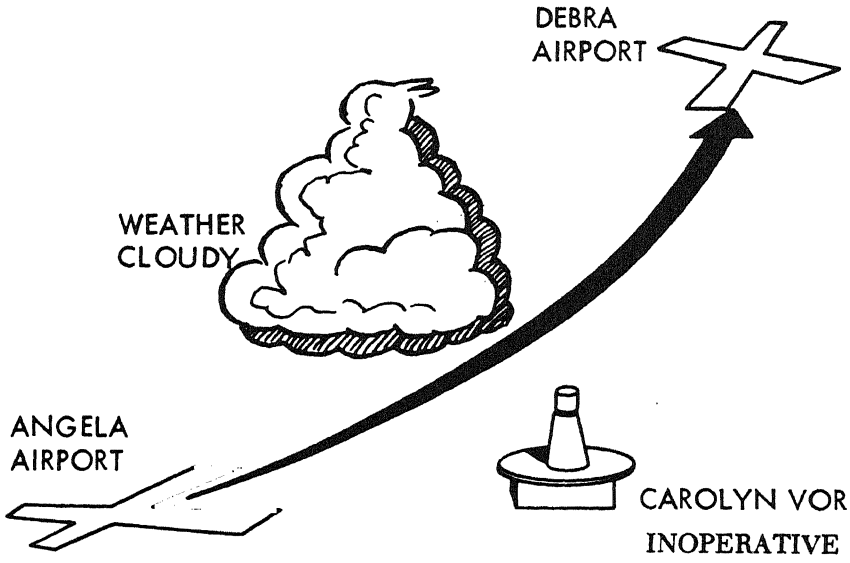
AI B.

AI C.

W D.

AI E.

W F.



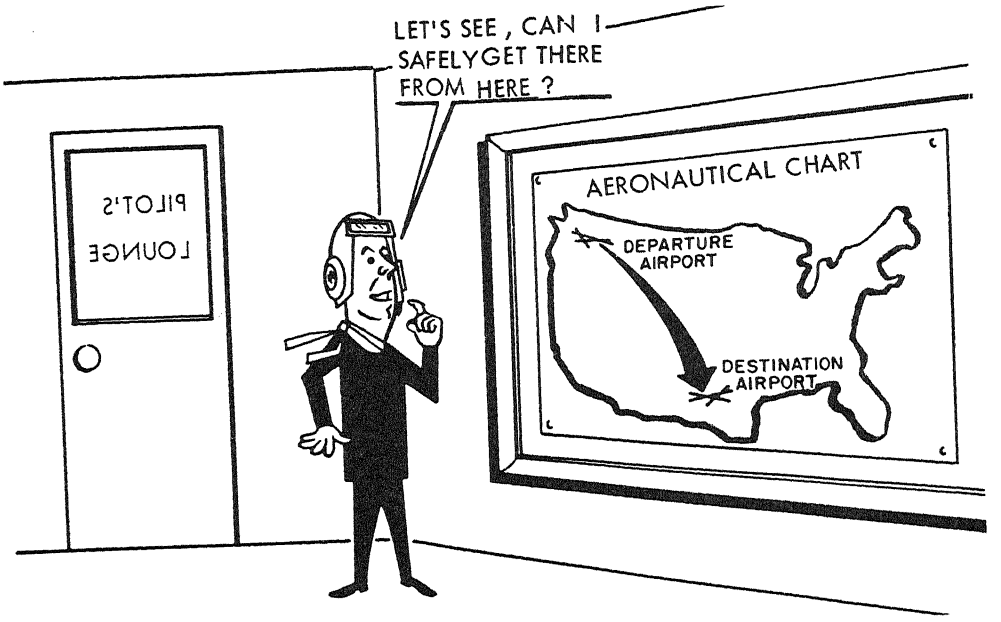
A pilot plans to fly from Angela to Debra. What weather and aeronautical information should the specialist give the pilot during the preflight briefing?

.....

.....

Weather - Cloudy

Aeronautical information - Carolyn VOR inoperative.



What does preflight planning help to insure?

.....

A safe flight.

204

If a pilot cannot visit a Flight Service Station, how can he ob a preflight briefing?

.....

By telephone or radio

205

What two kinds of information are furnished by specialists duri preflight briefings?

.....

.....

Weather

Aeronautical information

)6

A pilot should fill out a flight plan form and give it to an Air Traffic Control Specialist. This procedure insures search and rescue service in the event the aircraft does not arrive at its destination.

FLIGHT PLAN RECORD (FAA Use Only)

1. TYPE	2. AIRCRAFT IDENTIFICATION	3. AIRCRAFT TYPE/ SPECIAL EQUIPMENT	4. TRUE AIRSPEED	5. DEPARTURE POINT	6. DEPARTURE TIME		7. CRUISING ALTITUDE
					PROPOSED (Z)	ACTUAL (Z)	
X VFR IFR DVFR	N6864S	C 21Ø	18Ø KTS	PWA	173Ø		55

8. ROUTE OF FLIGHT

OKC V163

9. DESTINATION (Name of airport and city)	10. EST. TIME EN ROUTE		11. REMARKS
	HOURS	MINUTES	
ADM	ØØ	5Ø	

12. FUEL ON BOARD		13. ALTERNATE AIRPORT(S)	14. PILOT'S NAME, ADDRESS, TELEPHONE NUMBER, AND AIRCRAFT HOME BASE	15. NUMBER ABOARD
HOURS	MINUTES			
Ø4	55		HAROLD WELLER 3605 BLAKE ST. OKLAHOMA CITY, OKLA.	2

16. COLOR OF AIRCRAFT	☐ WEATHER BRIEFING	SPECIALIST INITIALS	TIME STARTED	☐ VNR
BLUE + WHITE				

FAA Form 7233—3 (3-72)

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Refer to the above illustration when answering the following questions.

.....

.....

PWA (Wiley Post)

ADM (Ardmore)

207

How much fuel is aboard the aircraft?

.....

---

4 hours 55 minutes

208

What type of flight plan was filed?

.....

VFR

209

What is the aircraft identification?

.....

N6864S

210

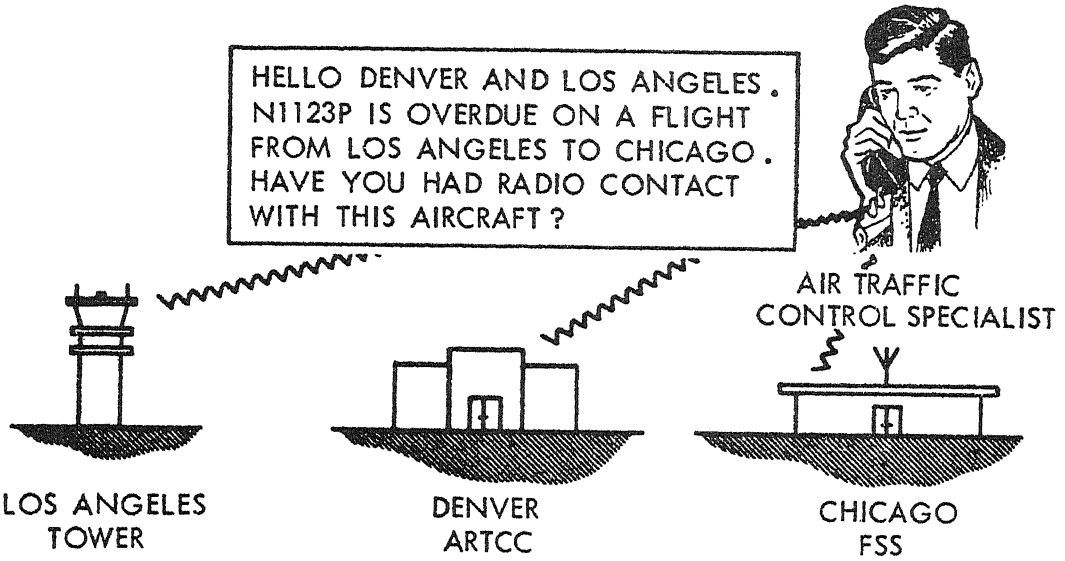
What is the reason for filing a VFR flight plan?

.....

To assure search and rescue service in the event the aircraft
not arrive at its destination.

211

Air Traffic Control Specialists are responsible for initiating communications searches for known overdue aircraft. They may use telephone, teletypewriter, or other available communication media in attempting to locate these aircraft.



In the above illustration what method of communication is being used to conduct the communications search?

.....

Telephone

212

In addition to the telephone, what other media may be used to locate overdue aircraft?

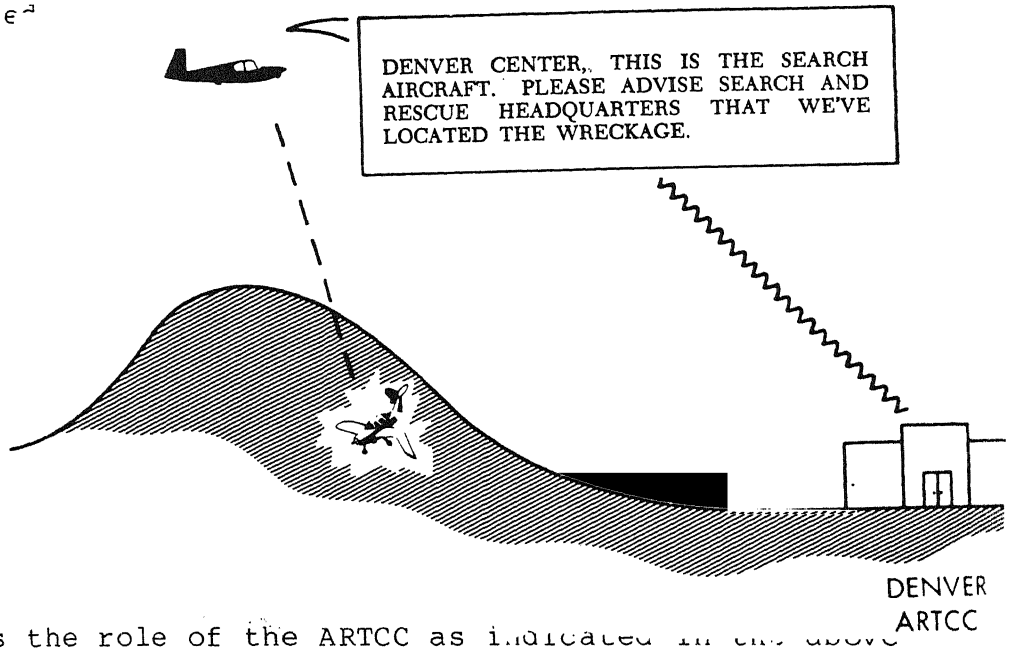
.....

.....

Teletypewriter or other available communications.

213

If a communications search does not result in locating an airc Air Traffic Facilities cooperate with the various search and rescue facilities if a physical search for the aircraft must b conducte



What is the role of the ARTCC as indicated in the above illustration?

.....

Relay information to search headquarters.

214

Name the two types of searches that may be conducted for an aircraft.

.....

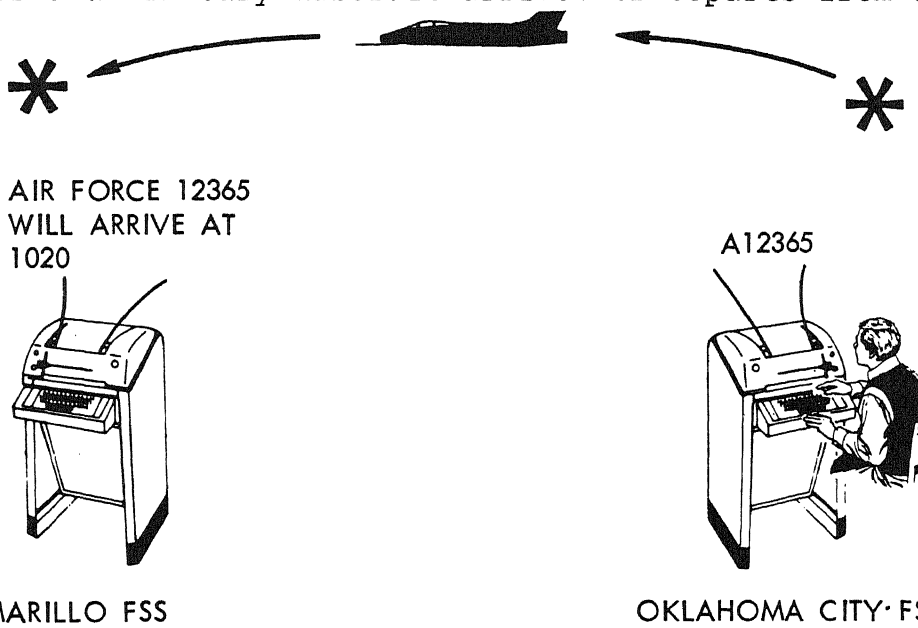
.....

Communication

Physical

15

Air Traffic Control Specialists support military flight activities. An important part of this support involves the transmission of a message every time a military aircraft arrives or departs from an airport.



What will

.....

Transmit a message to Amarillo.

16

Which of the following are considered as Flight Assistance Services?

..... A. Inflight

..... B. Post-flight

..... C. Preflight

..... D. Search and rescue

A.

C.

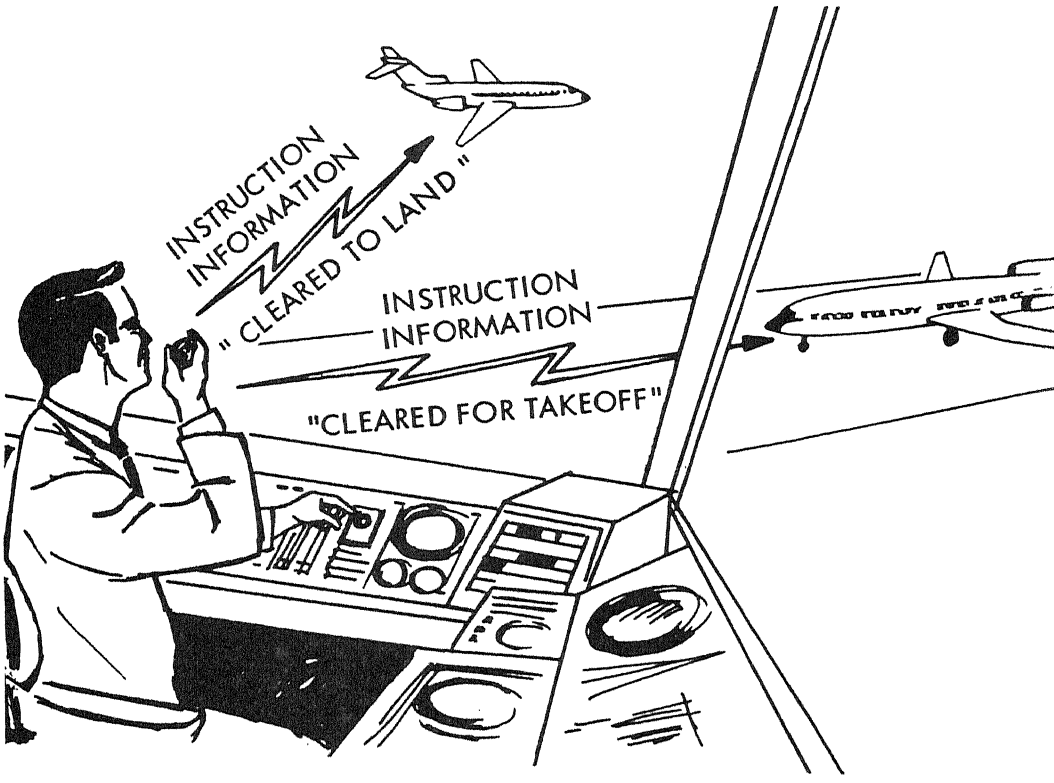
D.

217

Earlier you were shown pictures of a control tower. No
learn a little of what the tower specialist does at the
positions of operation.

218

An Airport Traffic Control Tower issues instructions an
tion to pilots.



Where are the Air Traffic Controllers located who contro
ment of aircraft on the taxiways, runways and in the air
airport?

.....

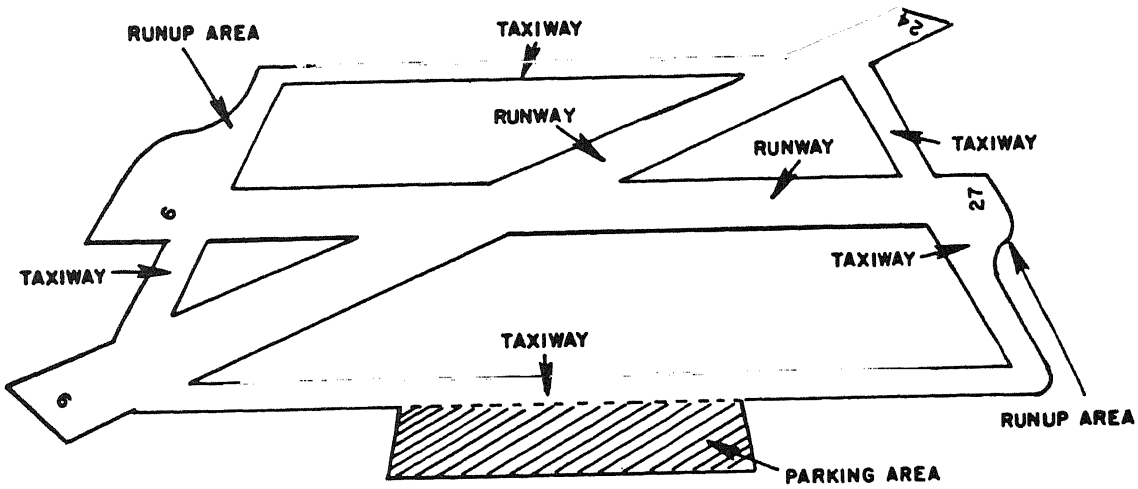
Control Tower

219

The local controller and the ground controller are responsible for different portions of the movement area.

A movement area includes runways, taxiways, and other areas of an airport which are utilized for the taxiing, departing, and landing of aircraft. Movement areas do not include loading ramps and parking areas.

THIS IS A MOVEMENT AREA



What part of the movement area is controlled by the local controller?

.....

The runways

220

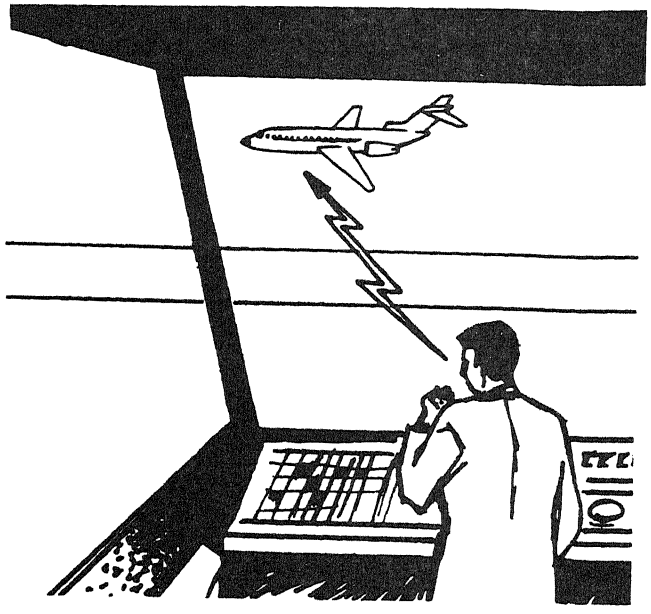
Name the area controlled by the ground controller.

.....

Taxiways

221

The local controller controls aircraft in the air and on the runways.



What name is given to the controller in the tower who issues instructions and information to pilots in airborne aircraft in th vicinity of an airport?

.....

Local Controller

222

The local controller also controls aircraft while they are landin or taking off.

What part of an airport do aircraft use for landing or takeoff?

.....

Runways

23

A local controller issues instructions and information to pilots when aircraft are in two defined areas. Name these areas.

.....

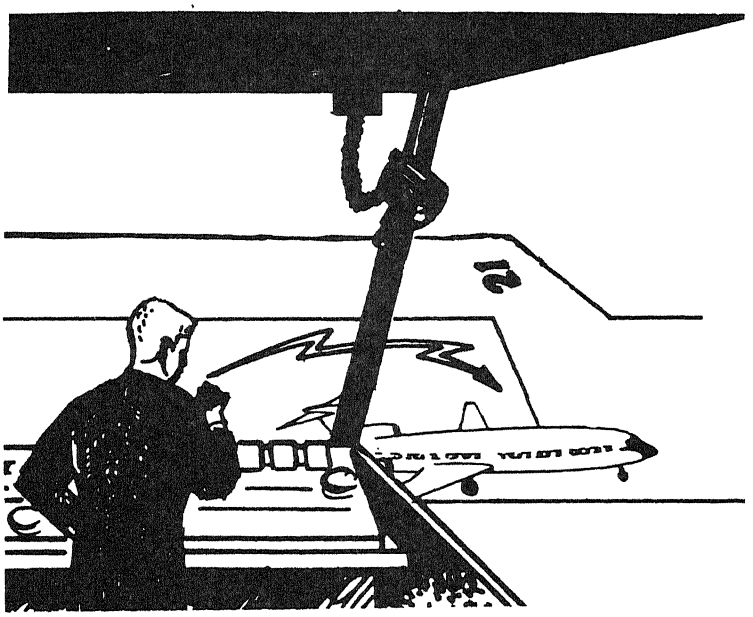
.....

When aircraft are in the vicinity of an airport.

When aircraft are on the runway.

24

A ground controller controls aircraft on the ramps and taxiways.



If an aircraft desires to leave the parking area and move to a taxiway, the pilot will contact the:

..... A. Ground Controller

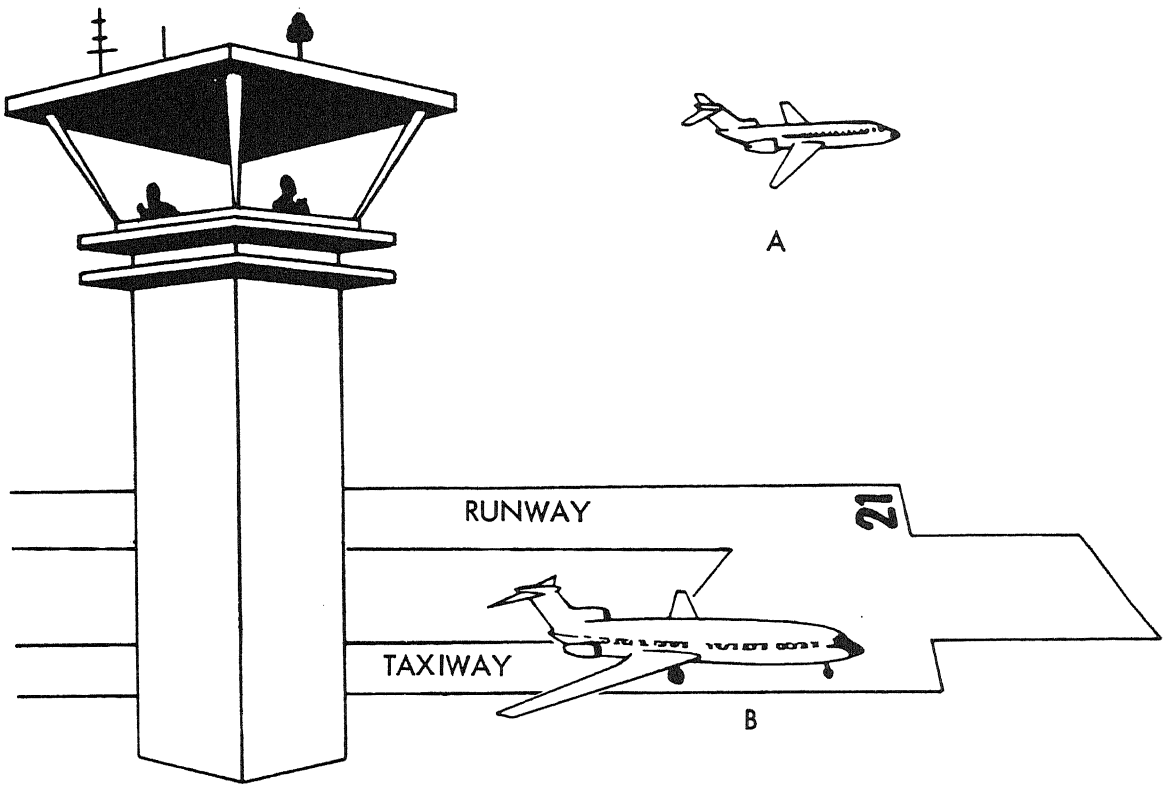
..... B. Communication Specialist

..... C. Airport Manager

..... D. Local Controller

A.

225



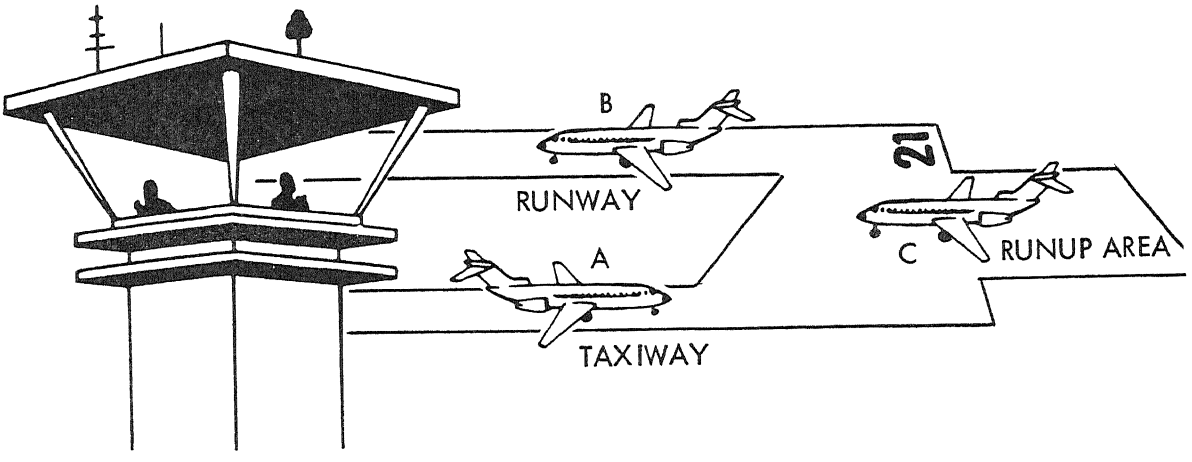
The local controller normally communicates with which aircraft?

..... A.

..... B.

A.

226



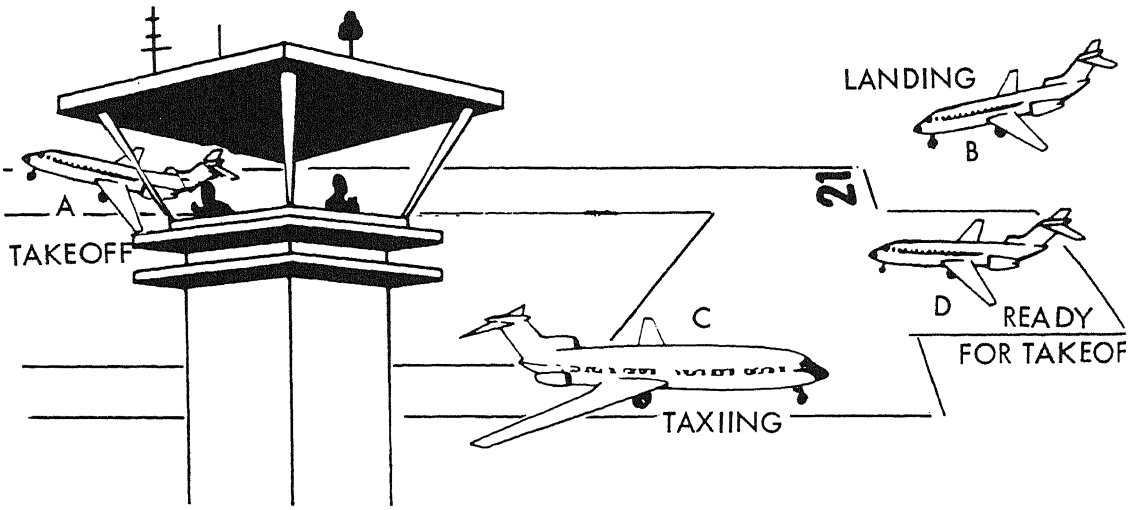
Which controller will aircraft C contact to receive takeoff clearance?

.....

The local controller

227

The local controller uses established separation standards to separate landing and departing aircraft.



Which aircraft above are controlled by the local controller and which are controlled by the ground conroller?

..... A.

..... B.

..... C.

..... D.

Local Controller ..... A.

Local Controller ..... B.

Ground Controller ..... C.

Local Controller ..... D.

228

Separation is most critical between which two aircraft in the previous illustration?

..... A. and B.

..... C. and D.

..... B. and D.

A. and B.

229

Which portion of the movement area is controlled by the ground controller?

.....

Taxiways

230

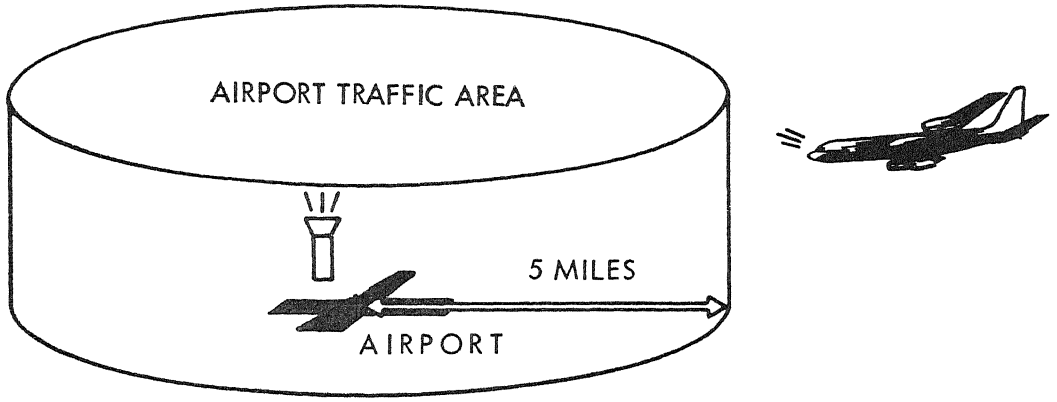
When two aircraft are departing, who is responsible for issuing instructions which will keep the aircraft separated?

.....

The local controller

231

A pilot who wishes to enter an airport traffic area and land must have permission to enter this area.



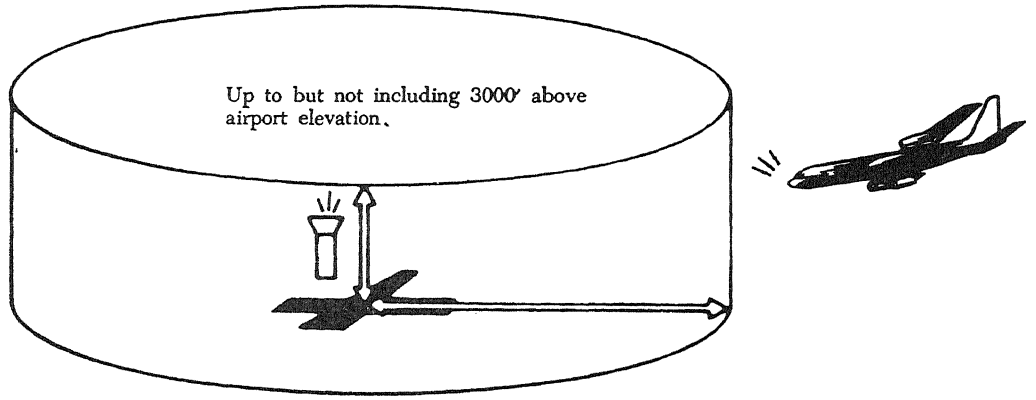
Which controller would respond to a landing request from a pilot?

.....

The local controller.

232

Look at the airport traffic area illustrated below.



Pilots must obtain permission when they wish to fly within what radius and altitude of an airport?

.....

.....

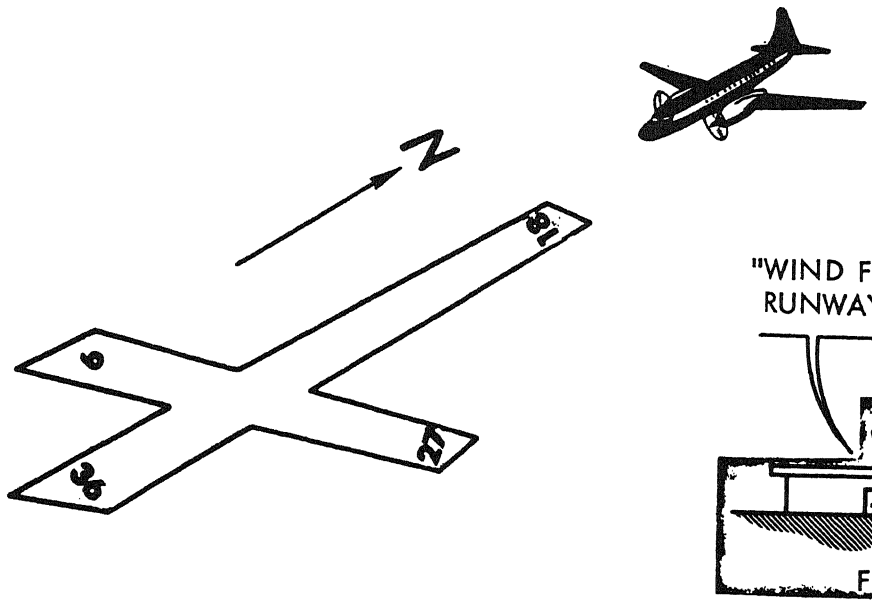
---

5 miles

Below 3000 feet above airport elevation.

233

Where a tower is not in operation, certain designated FSS will issue wind, runway, and traffic information to arriving and departing aircraft. This is called Airport Advisory Service (AAS).



What two kinds of inflight information may the specialist give the pilot shown in addition to traffic information?

.....

.....

Wind

Runway

234

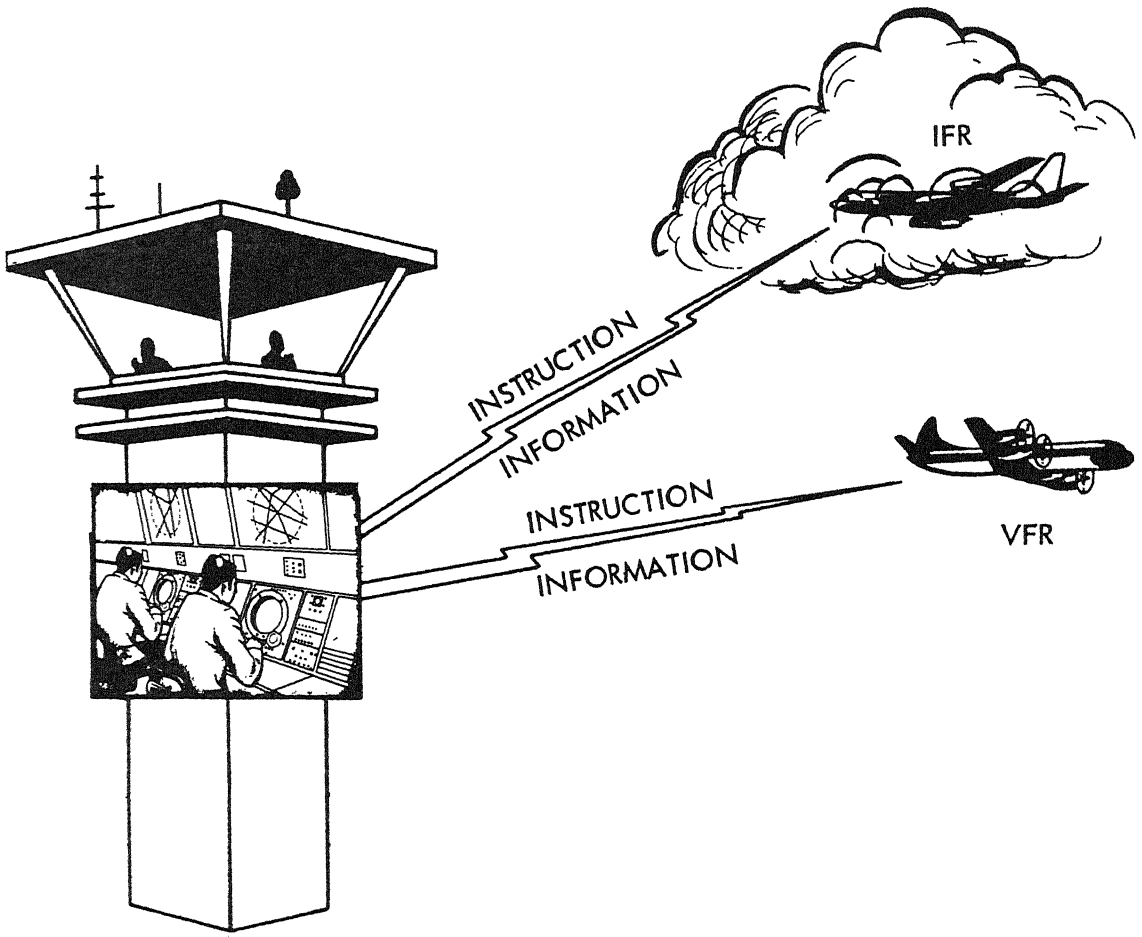
Which Air Traffic Facility provides Airport Advisory Service?

.....

FSS

235

Approach Control is an additional control service at airports. Controllers may be located in a room under the cab in the contro tower. See illustration below.



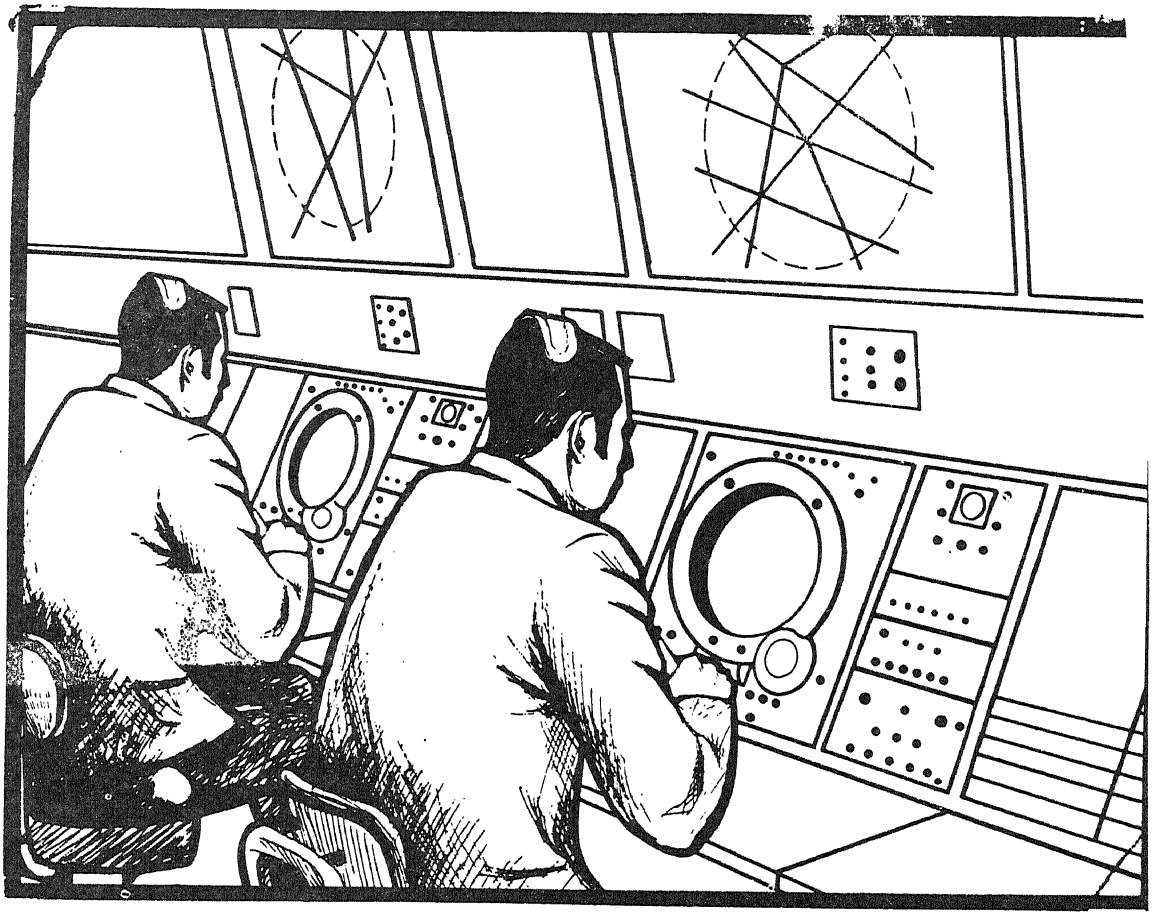
What is similar about the service provided by the local, ground, and approach controllers?

.....

All provide instruction and information to pilots.

36

Approach controllers use radio and radar to separate and sequence aircraft.



Approach controllers separate and sequence:

..... A. IFR aircraft only.

or

..... B. Both IFR and VFR aircraft.

B.

237

What kinds of ground equipment do approach controllers use to separate and sequence aircraft prior to landing?

.....

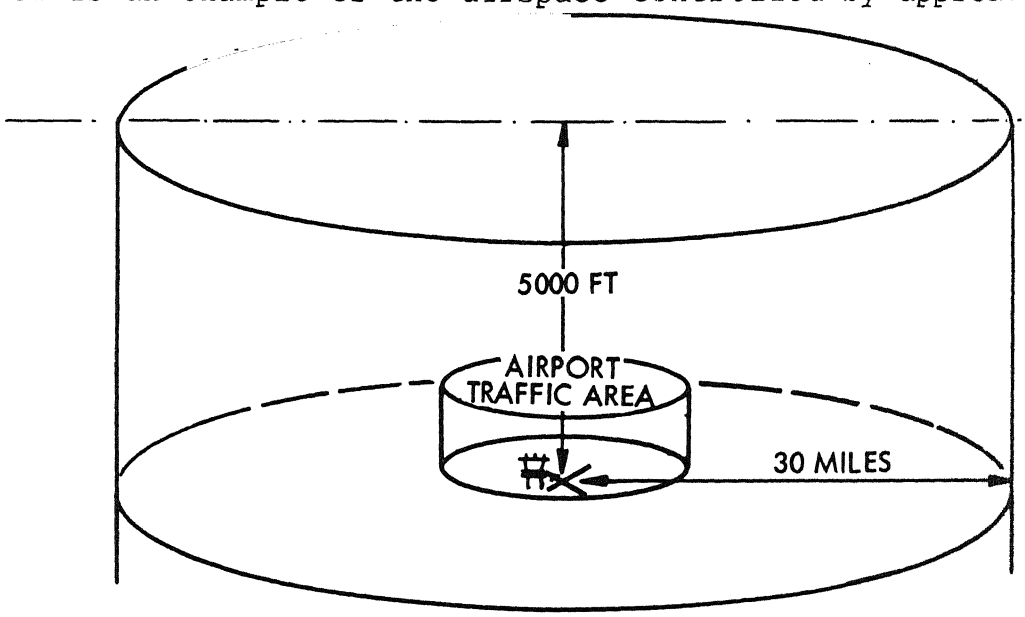
.....

Radio

Radar

238

Shown below is an example of the airspace controlled by approac control.



The above example illustrates the fact that the approach control is responsbile for more airspace than the local controller. Sta the dimensions of the airspace under the jurisdiction of the loc controller.

.....

.....

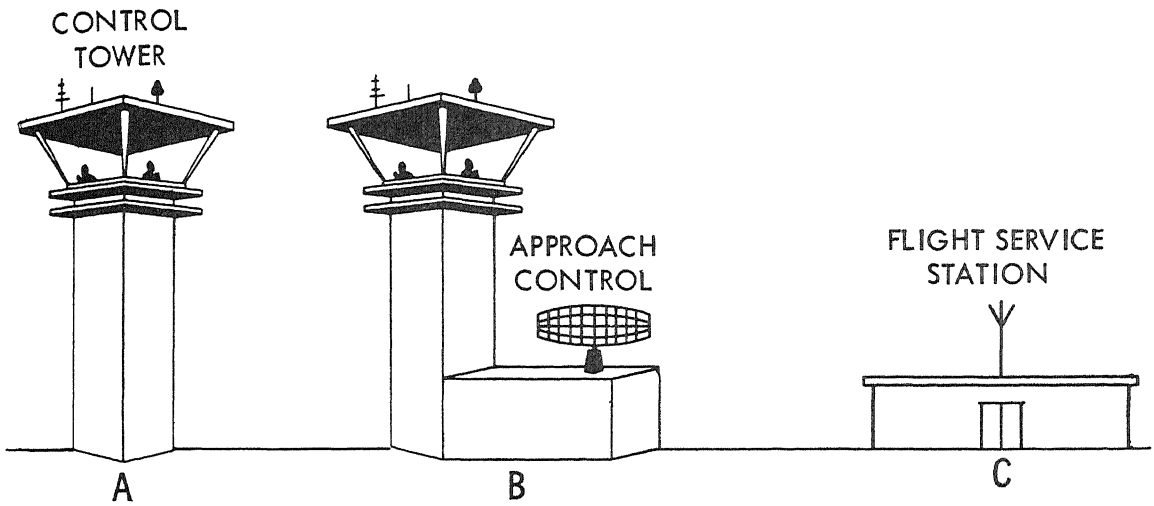
.....

---

1. Within a 5-mile radius of the airport.

2. Up to but not including 3000 feet above the airport elevatio

239



Which facility controls IFR aircraft within 30 miles of the airport?

..... A.

..... B.

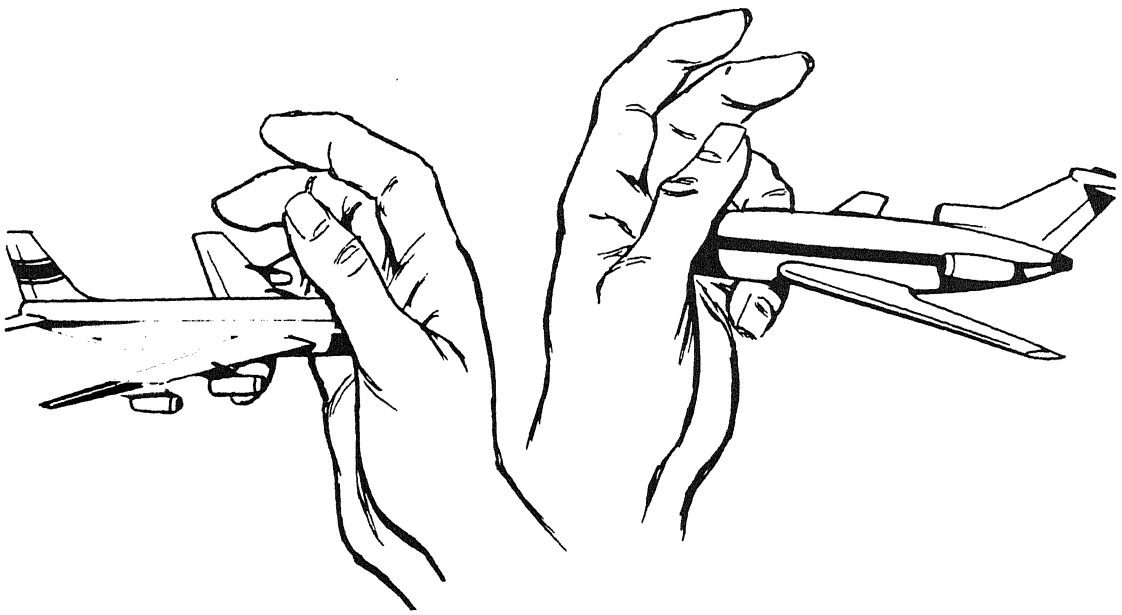
..... C.

B.

240

After an IFR aircraft leaves the jurisdiction of the control tower he comes under the control of the Air Route Traffic Control Center. The Center will handle the aircraft en route until transferring control to the tower at the destination airport. This section will examine the various duties performed by the Center Specialist.

An Air Route Traffic Control Center's main function is to prov for the safe, orderly, and expeditious movement of traffic operating on the airways.



A controller's primary responsibility is to prevent:

..... A. Airway congestion.

..... B. Delays.

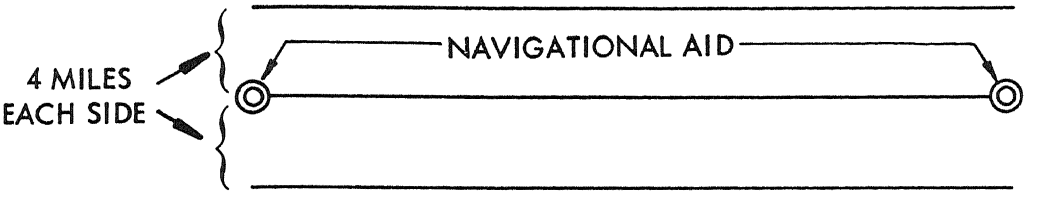
..... C. Collisions.

..... D. Confusion.

C.

242

An airway is a highway in the sky, usually eight-miles wide, established by the Federal Government and marked by navigational aids on the ground.



FEDERAL AIRWAY

Airways are imaginary highways in the sky and are established by:

..... A. Centers.

..... B. Stations.

..... C. Towers.

..... D. The Federal Government.

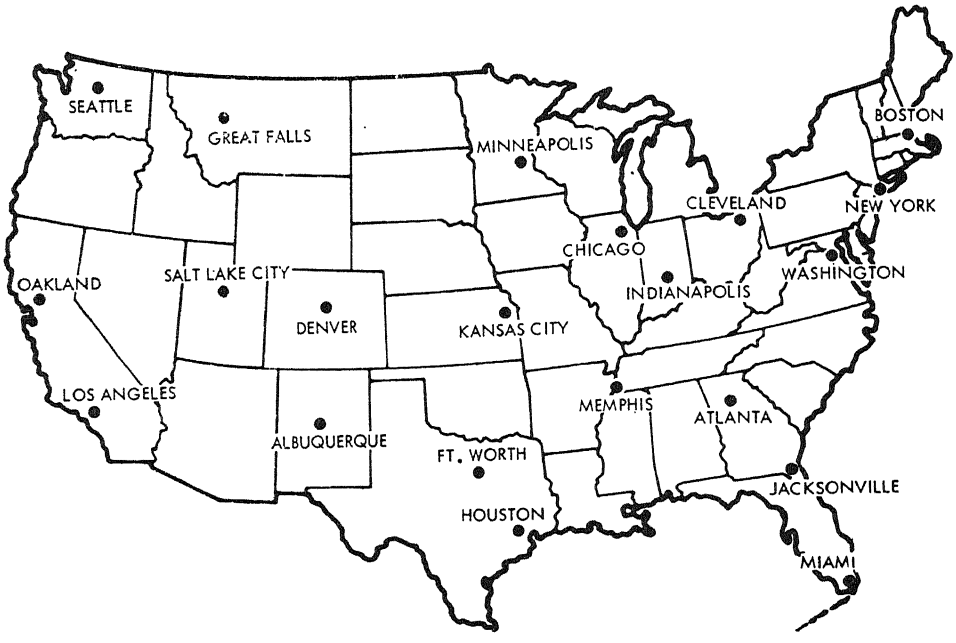
D.

---

243 There are 21 centers located in the Continental United States. These centers are responsible for separating IFR aircraft operat on the Federal airway system. The location of each center is sh in the illustration below.

LOCATION OF ARTCCs IN THE CONTINENTAL U.S.

AS OF JUNE 1970



Which center is responsible for separating air traffic in Sout California?

..... A. Seattle

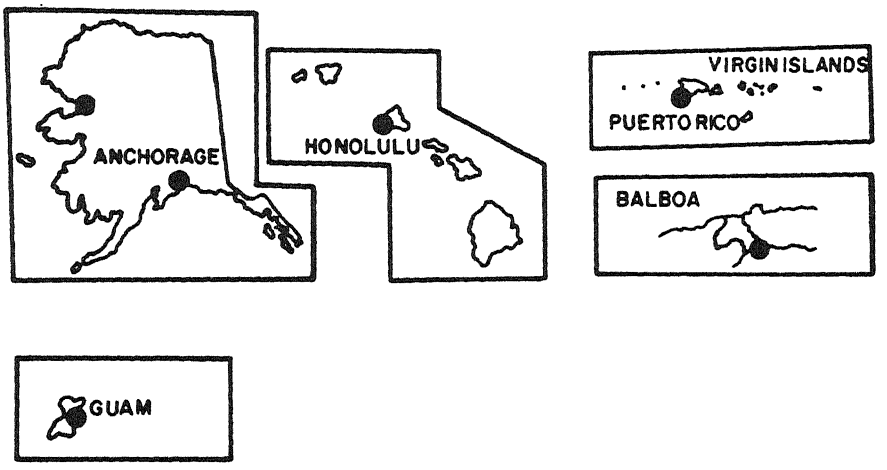
..... B. Oakland

..... C. Los Angeles

C.

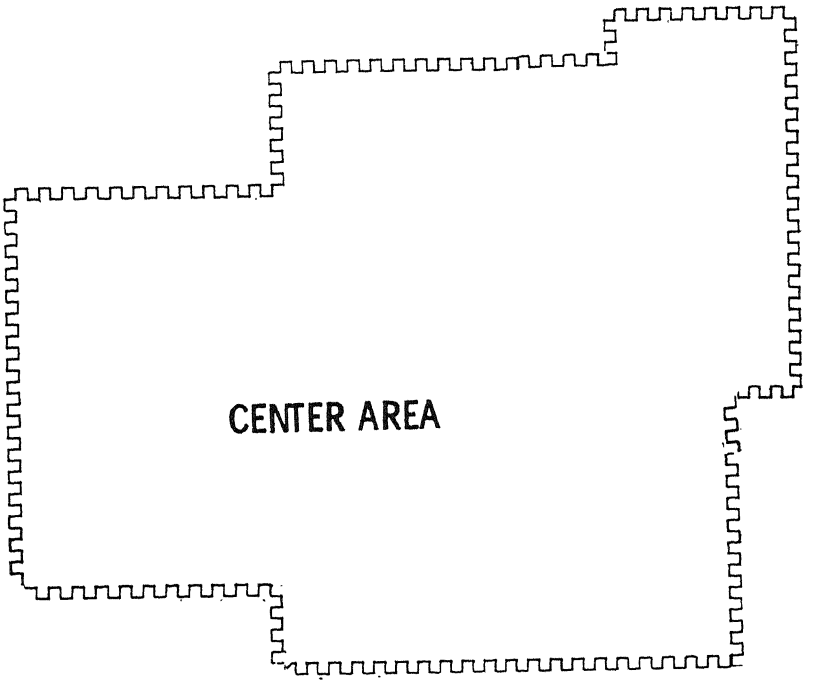
244

There are six other centers in various geographical locations operated by the Federal Government. These locations are: (1) Anchorage, (2) Honolulu, (3) Guam, (4) Puerto Rico, (5) Balboa, and (6) Virgin Islands.



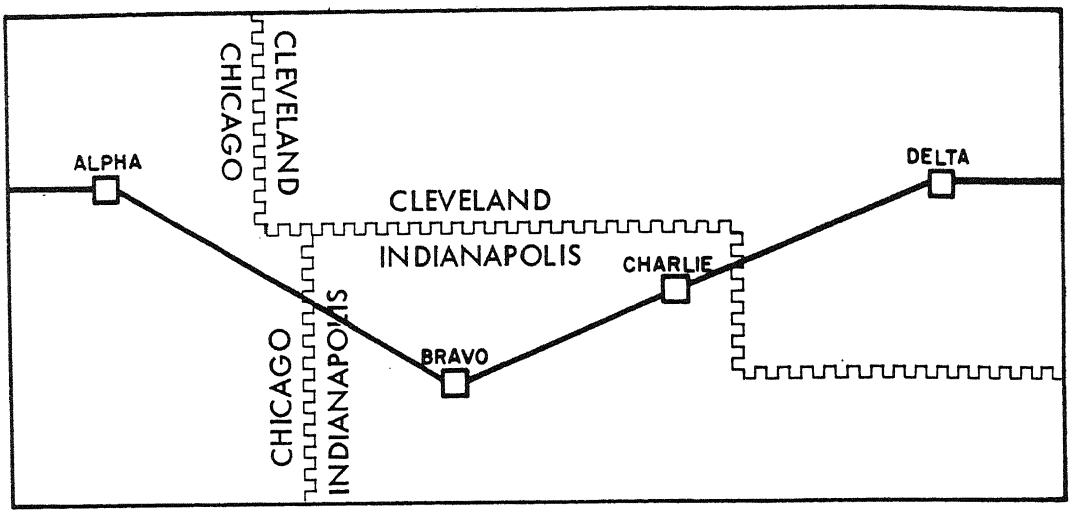
245

Each center is responsible for providing air traffic service in a designated airspace. This airspace is called the center's area and the boundary of each is marked on maps of the airway system (aeronautical charts), as shown in the illustration below.



246

A pilot is operating his aircraft along the route marked in the illustration below, and is receiving separation service from ai control.



Which center controls this flight when it is over the following cities:

..... A. Alpha

..... B. Bravo

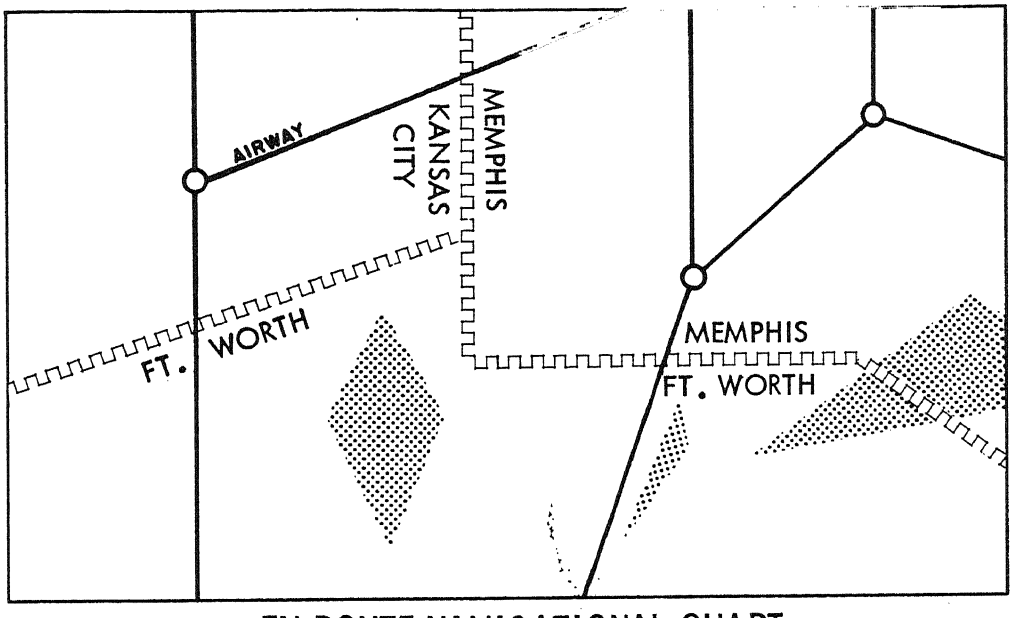
..... C. Charlie

..... D. Delta

Chicago Center	A. Alpha
Indianapolis Center	B. Bravo
Indianapolis Center	C. Charlie
Cleveland Center	D. Delta

247

Within each center's area, there are areas of controlled and uncontrolled airspace. Controlled airspace is made up of designated airways and routes. In the illustration below the SHADED area represents uncontrolled airspace and the white area is controlled airspace.



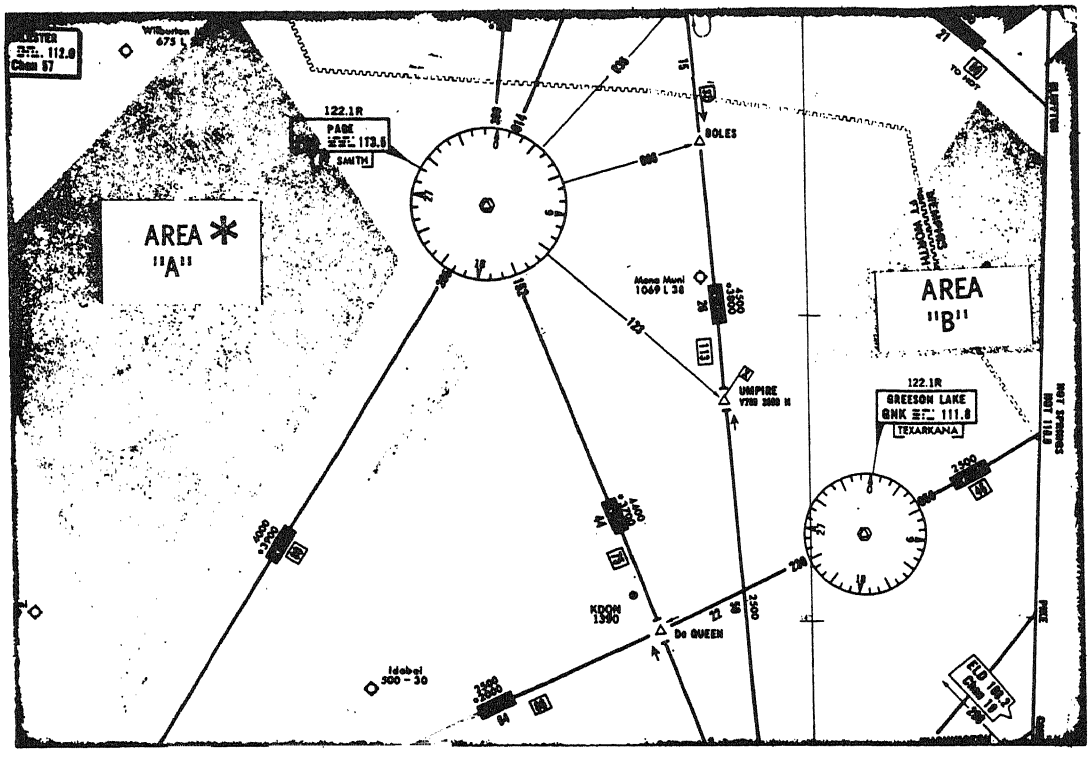
EN ROUTE NAVIGATIONAL CHART

In the above example, the only center area which does not contain some uncontrolled airspacae is the ..... area.

Kansas City

248

Aircraft that are operating in uncontrolled airspace do not receive separation service. The pilot assumes responsibility for avoiding other aircraft.



* SHADED AREAS - UNCONTROLLED AIRSPACE

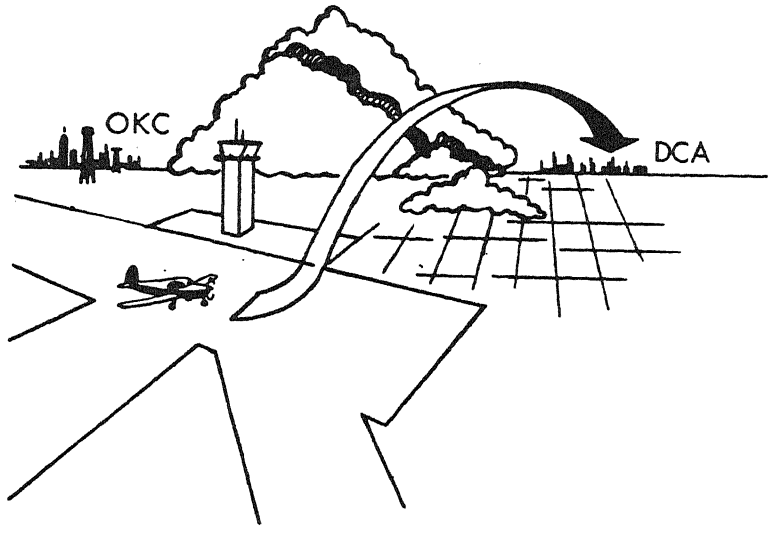
In the above illustration, who is responsible for avoiding other aircraft in area "A"?

.....

The pilot

249

A center controls aircraft operating on an IFR flight plan between the departure and the destination airports.



IFR - OKLAHOMA CITY TO WASHINGTON, D.C.

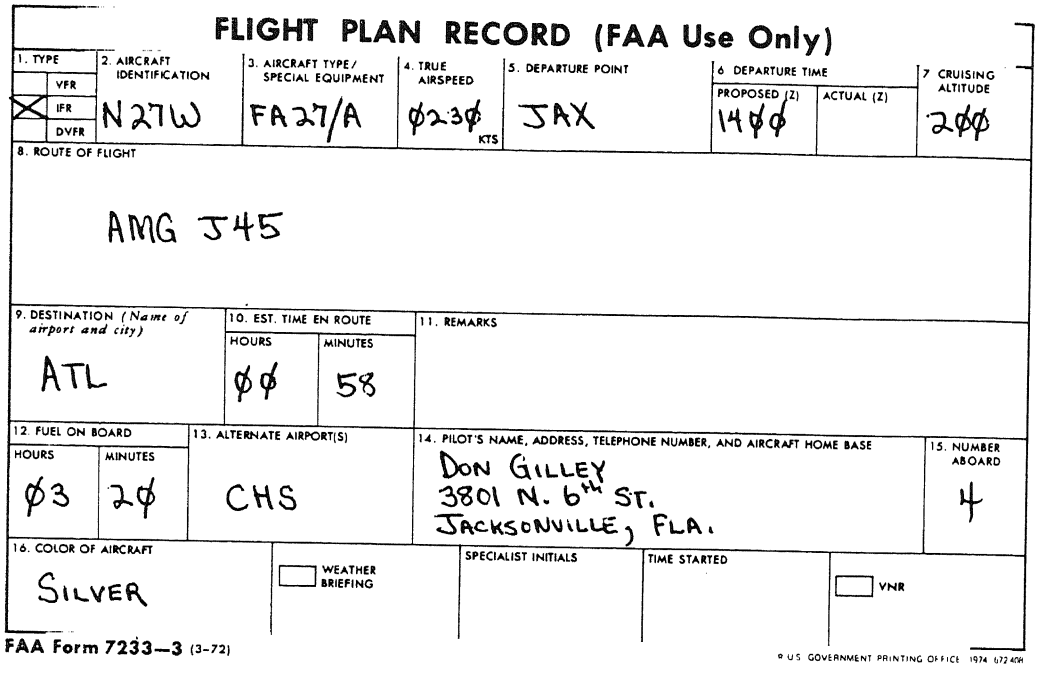
In the above illustration, the aircraft is under the control of the tower while operating in the vicinity of the airport. What type of facility is controlling the aircraft en route to Washington, D.C.?

.....

Center

250

A pilot requests separation service from other aircraft by filing an instrument flight plan. The illustration below is an example of a typical instrument flight plan.



FLIGHT PLAN RECORD (FAA Use Only)

1. TYPE	2. AIRCRAFT IDENTIFICATION	3. AIRCRAFT TYPE/ SPECIAL EQUIPMENT	4. TRUE AIRSPEED	5. DEPARTURE POINT	6. DEPARTURE TIME		7. CRUISING ALTITUDE
					PROPOSED (Z)	ACTUAL (Z)	
VFR							
X IFR	N27W	FA27/A	023 KTS	JAX	1400		200
DVFR							

8. ROUTE OF FLIGHT: AMG J45

9. DESTINATION (Name of airport and city)	10. EST. TIME EN ROUTE		11. REMARKS
	HOURS	MINUTES	
ATL	00	58	

12. FUEL ON BOARD		13. ALTERNATE AIRPORT(S)	14. PILOT'S NAME, ADDRESS, TELEPHONE NUMBER, AND AIRCRAFT HOME BASE	15. NUMBER ABOARD
HOURS	MINUTES			
03	20	CHS	DON GILLEY 3801 N. 6TH ST. JACKSONVILLE, FLA.	4

16. COLOR OF AIRCRAFT	☐ WEATHER BRIEFING	SPECIALIST INITIALS	TIME STARTED	☐ VNR
SILVER				

FAA Form 7233–3 (3-72)

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What method is used by a pilot to request his flight be separated from other aircraft?

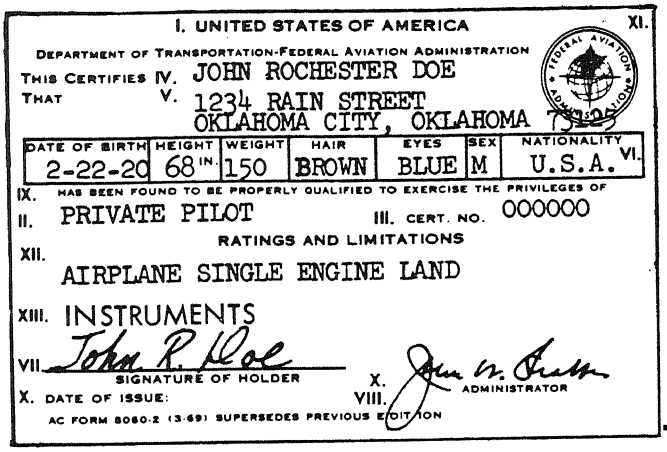
..... A. The pilot files a VFR flight plan.

..... B. The pilot files an IFR flight plan.

B.

251

A requirement for filing an instrument flight plan is: (1) the pilot is instrument-rated and (2) the aircraft is equipped with certain instruments.



I. UNITED STATES OF AMERICA — XI.

DEPARTMENT OF TRANSPORTATION-FEDERAL AVIATION ADMINISTRATION

THIS CERTIFIES IV. JOHN ROCHESTER DOE

THAT V. 1234 RAIN STREET
OKLAHOMA CITY, OKLAHOMA 73105

DATE OF BIRTH	HEIGHT	WEIGHT	HAIR	EYES	SEX	NATIONALITY VI.
2-22-20	68 IN.	150	BROWN	BLUE	M	U.S.A.

IX. HAS BEEN FOUND TO BE PROPERLY QUALIFIED TO EXERCISE THE PRIVILEGES OF

II. PRIVATE PILOT III. CERT. NO. 000000

RATINGS AND LIMITATIONS

XII. AIRPLANE SINGLE ENGINE LAND

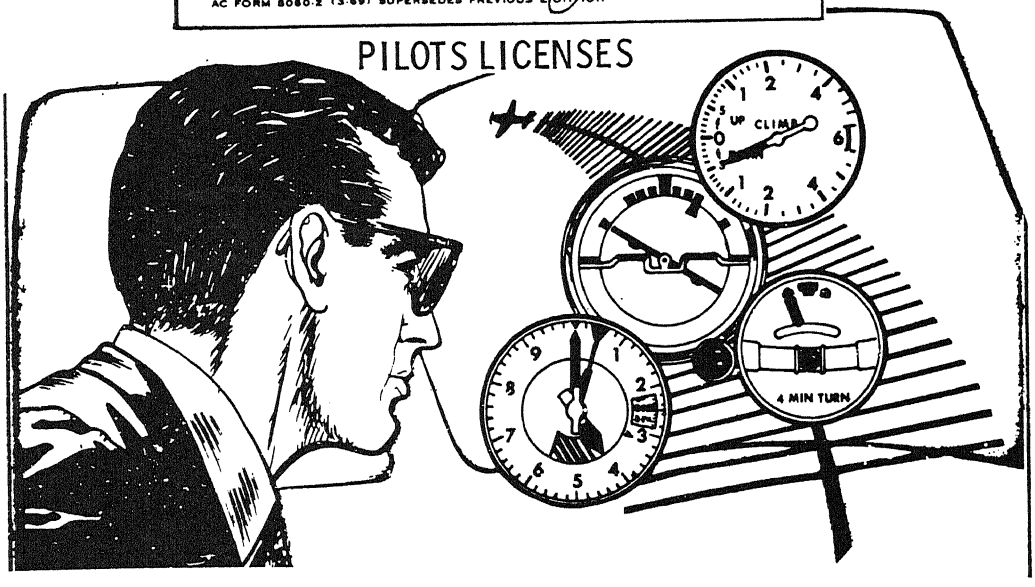
XIII. INSTRUMENTS

VII. John R. Doe
SIGNATURE OF HOLDER

X. DATE OF ISSUE:

X. John W. Smith
VIII. ADMINISTRATOR

AC FORM 8060-2 (3-69) SUPERSEDES PREVIOUS EDITION



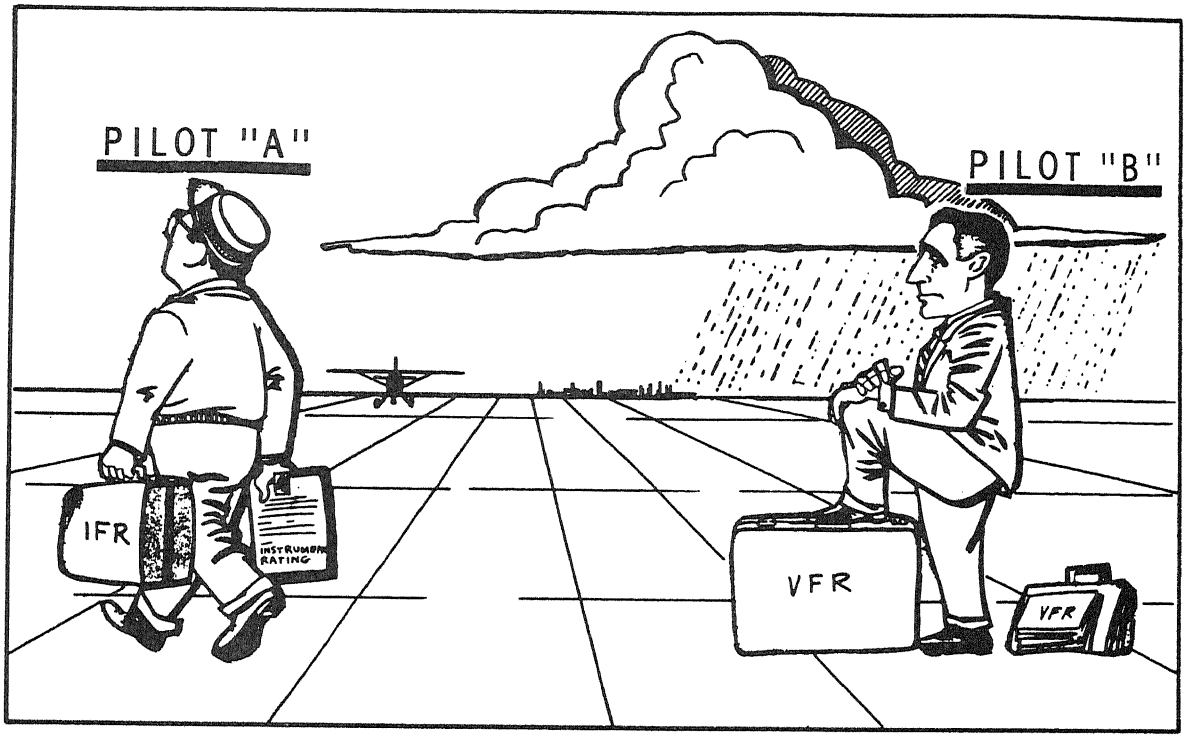
What special skills must a pilot possess in order to file an IFR flight plan?

.....

He must be instrument rated.

252

One of the primary advantages of being instrument-rated is that the pilot can take off and operate his aircraft in weather conditions that would keep non-instrument-rated pilots on the ground.



Identify the pilot who is qualified to operate in controlled airspace when low ceilings and poor visibilities exist.

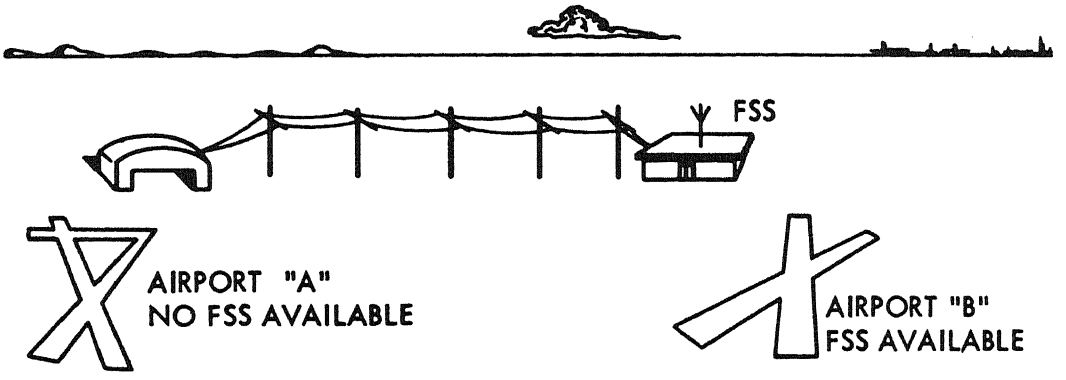
..... A. Pilot "A"

..... B. Pilot "B"

A.

253

Although a private pilot may file his instrument flight plan with any ATC facility, he is encouraged to file with a Flight Service Station. This may be done by one of three methods: in person, by telephone, or by two-way radio.



In the above illustration, a pilot wants to fly from airport "A" to airport "B". A station is not available on the departure airport. He should file his flight plan prior to departure with the nearest station by:

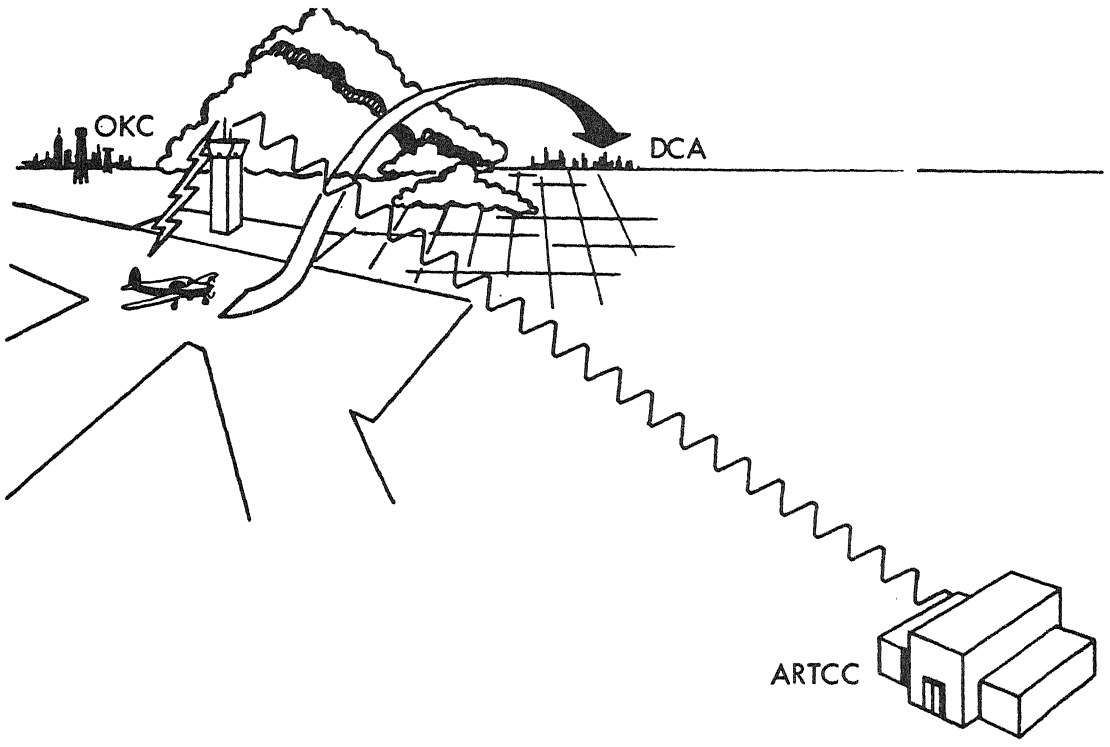
..... A. Two-way radio.

..... B. Telephone.

..... C. A personal visit.

B.

254 A pilot should file his IFR flight plan at least 30 to 45 minutes before proposed departure time. At airports with towers, the pilot calls the tower for a clearance when he is ready for departure. The tower calls the center for an IFR clearance and relays it to the pilot.



IFR - OKLAHOMA CITY TO WASHINGTON, D.C.

IFR - OKLAHOMA CITY TO WASHINGTON, D.C.

Who does the tower call for the IFR clearance?

..... A. Center

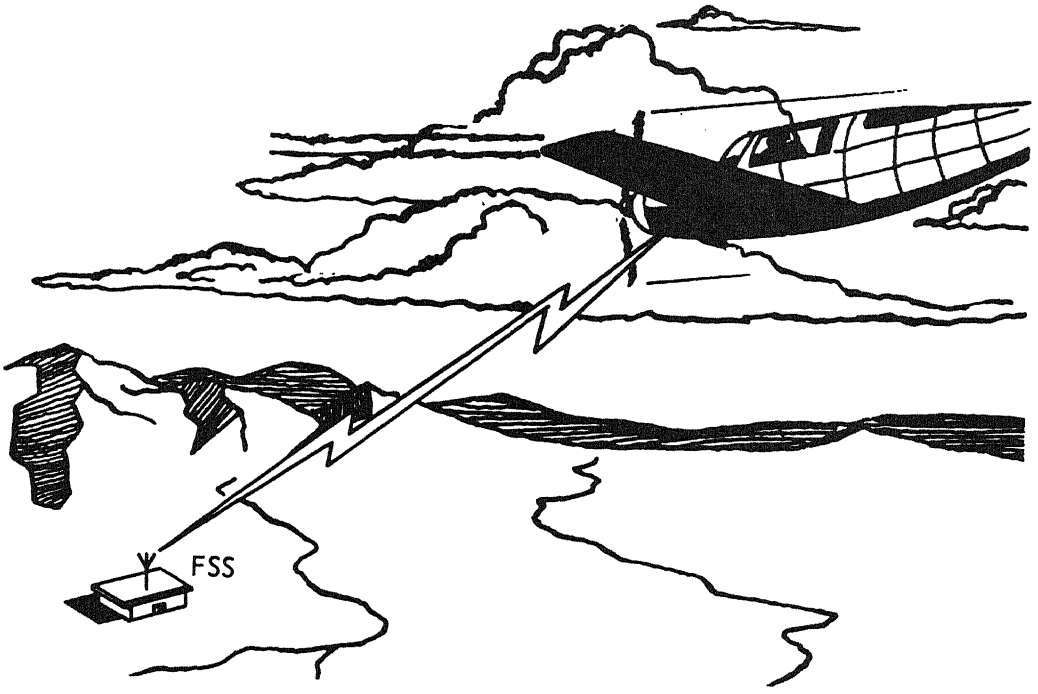
..... B. Station

..... C. Operations.

A.

255

A pilot is flying on a VFR flight plan and can see the weather deteriorating ahead of him. If qualified, he can file an IFR flight plan with an ATC facility by two-way radio.



A pilot in the air desiring to file an instrument flight plan is encouraged to contact the nearest:

..... A. Center

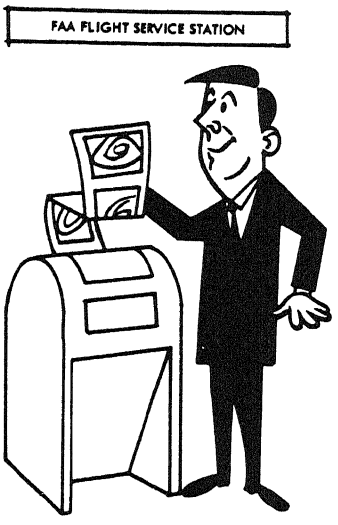
..... B. Station.

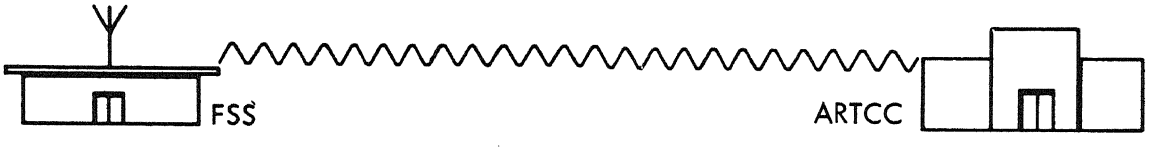
..... C. Tower.

B.

256

After the station receives an IFR flight plan from the pilot, t
specialist transmits the information to the center.





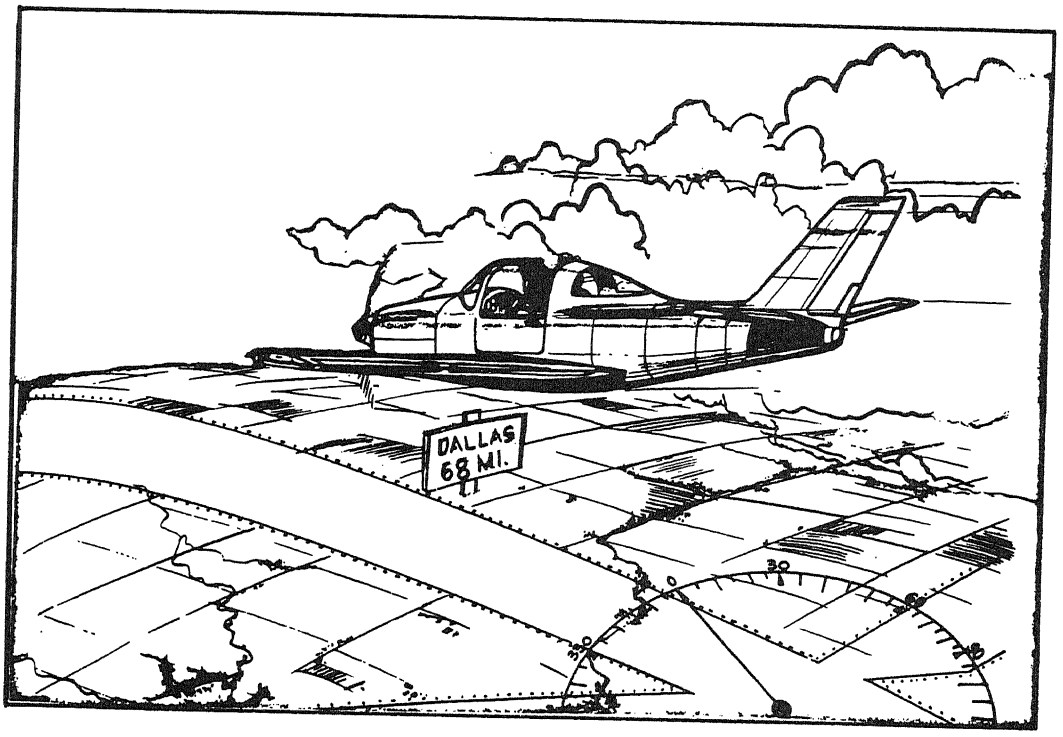
Who is responsible for sending IFR flight plan information to
center?

.....

The station

257

Many pilots fly within controlled airspace during good weather conditions without filing a flight plan. These pilots fly VFR and the center is not responsible for their separation.



The illustration above shows a pilot operating VFR in controlled airspace without a flight plan. Who is responsible for preventing collisions?

..... A. Center

..... B. Station

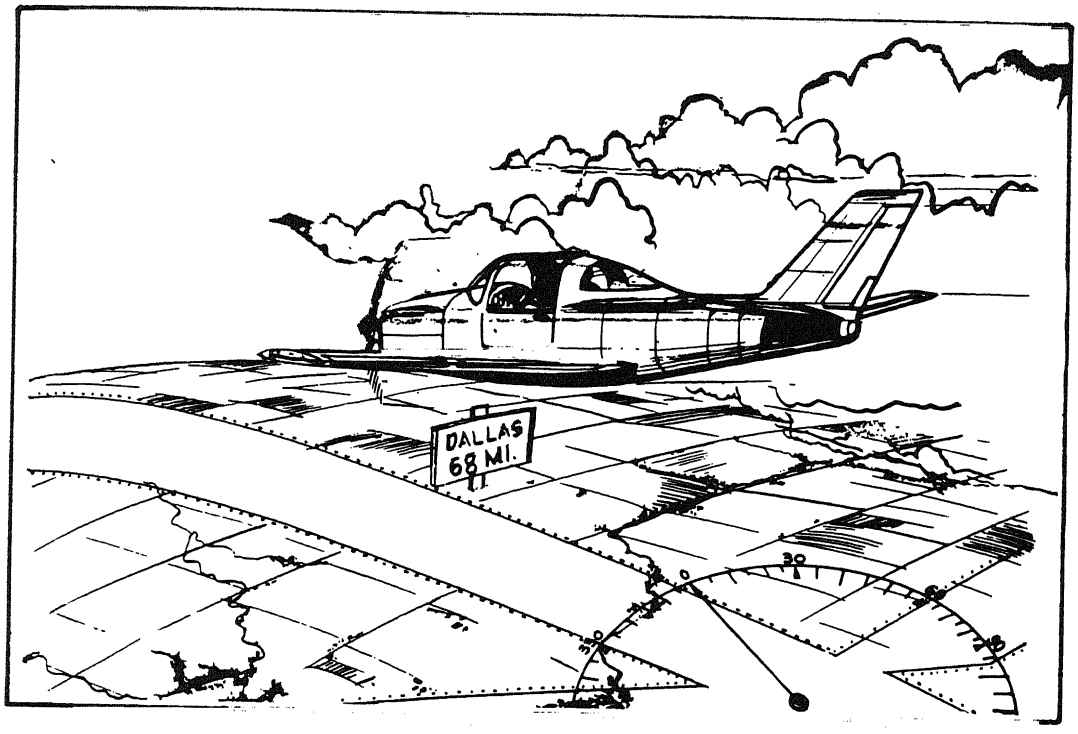
..... C. Pilot

..... D. Tower

C.

258

A pilot may file an IFR flight plan in good weather and receive the same separation service as he would receive flying in poor weather.



In order for a pilot to file an instrument flight plan there must exist along his route of flight areas of low ceilings and poor visibility.

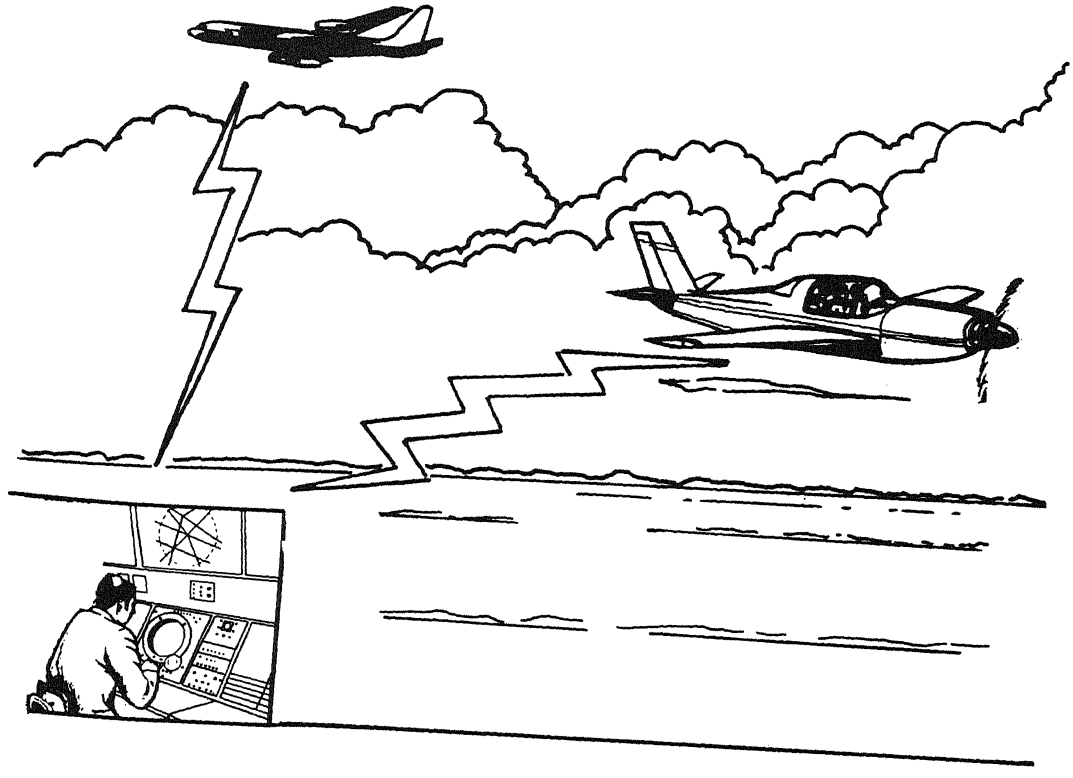
..... A. True

..... B. False

B.

259

An IFR clearance is required prior to instrument flight within controlled airspace. A pilot may file an IFR flight plan at any time, regardless of weather conditions, and receive separation service.



Prior to instrument flight along the airways, the pilot must receive:

..... A. A vector for radar identification.

..... B. Current weather reports.

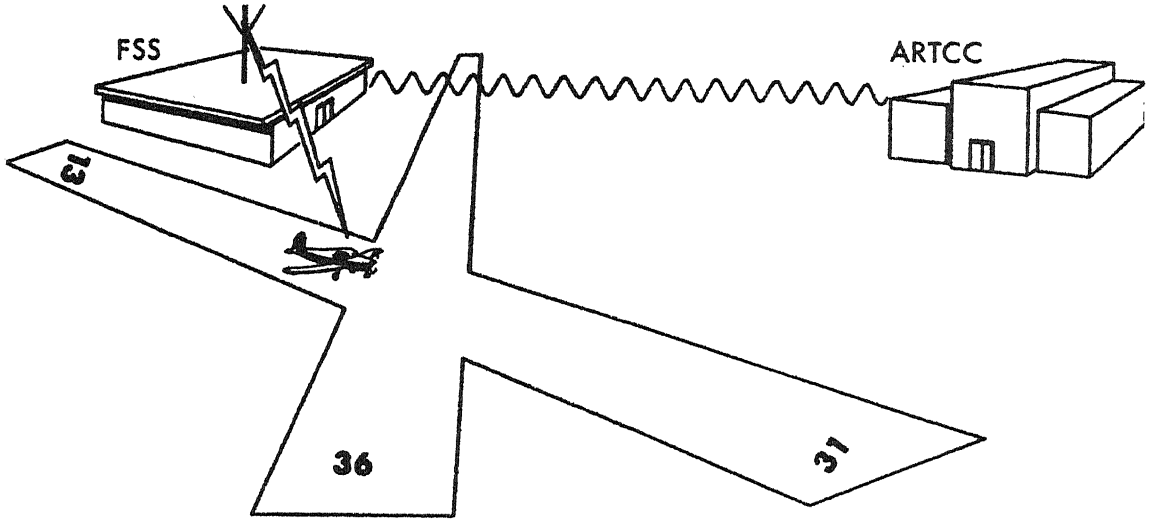
..... C. An IFR clearance.

C.

260

An IFR clearance is authorization by ATC, for the purpose of preventing collisions between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace. If a tower is not located at the departure airport, the pilot should call the station for his IFR clearance prior to departure. The station then calls the center for a clearance and relays it to the pilot.

261



A pilot is departing from an airport that has a station but no tower. In order to receive an IFR clearance prior to departure, the pilot should contact the:

..... A. Station

..... B. Center

..... C. Airport manager

A.

262

The illustration below is an example of a verbal air traffic clearance issued by a center.

" ATC CLEARS AMERICAN ONE-FIFTY TO CINCINNATI AIRPORT VIA J SEVENTY-SEVEN, J TWELVE LOUISVILLE VICTOR FIVE HEBRON DIRECT MAINTAIN FLIGHT LEVEL TWO FIVE ZERO CONTACT FORT WORTH CENTER ON ONE TWO FIVE POINT FIVE AFTER DEPARTURE."

The above example of a clearance is based upon known traffic conditions along the intended route of flight. The clearance originated in a:

..... A. Tower

..... B. Station

..... C. Center

C.

SECTION 8

BASIC CONCEPTS OF RADAR

263

Radar is probably the most important tool used today by center tower specialists to control air traffic. In this section you be exposed to the basic concepts of radar, what it looks like how it is used.

4

The underlined letters of the following words form the contraction of an aid to air traffic control. Radio Detection and Ranging. Write this contraction below.

.....

RADAR

5

In radar air traffic control, the controller must communicate directly with the pilot and observe the aircraft on radar.

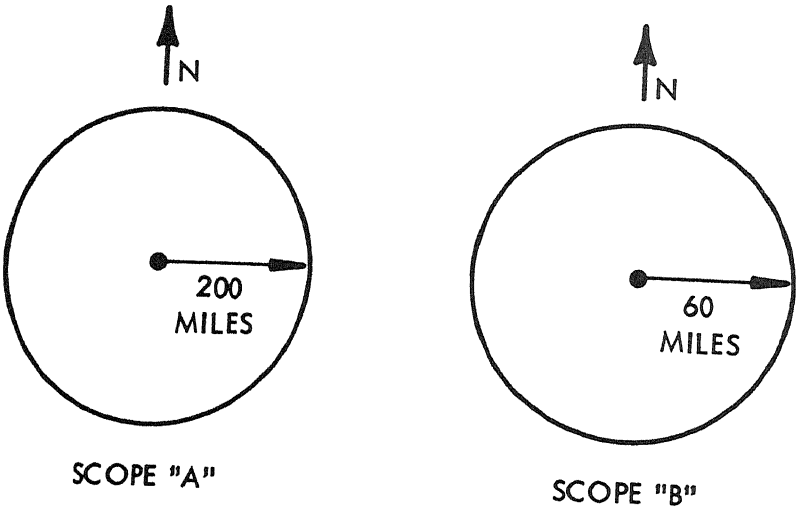
One rule of radar air traffic control is that the controller must be in direct ..... with the pilot.

---

communication

266

Radar is used in all centers and certain designated approach control facilities to control air traffic. Centers use long-ra radar and towers use medium range radar.



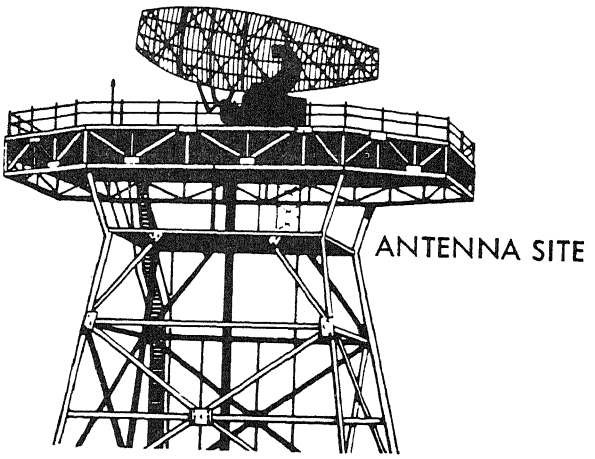
In the above illustration which radar scope would be used by a center?

.....

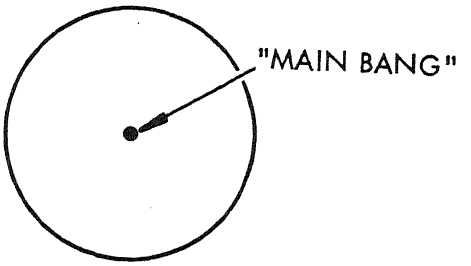
Scope "A"

267

The center of a radar scope represents the location of the radar antenna. In ATC, the term Main Bang is used to denote the radar antenna site.



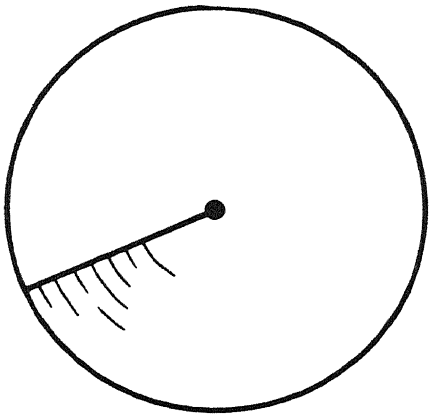
This is a picture of a long range radar antenna as it appears at the installation site.



This spot in the center of the scope is called the main bang and represents the antenna site.

268

A line sweeps around the radar scope similar to the second hand on a watch.



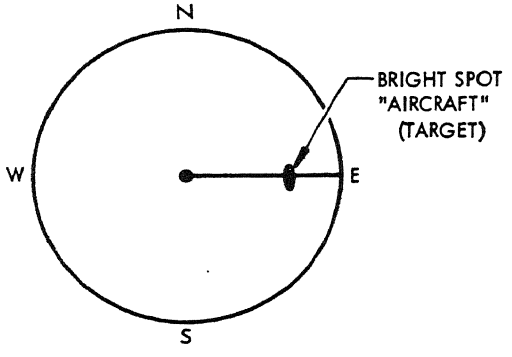
Look at the above illustration. In which direction is the sweep moving?

.....

Clockwise

269

The antenna emits a beam of radio energy which appears as the sweep on the face of the radar scope. When the beam strikes an object, part of the beam is reflected back to the antenna and appears as a bright spot on the scope. This bright spot is called a target.



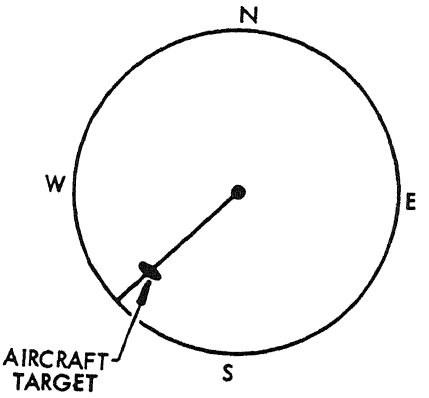
Look at the above illustration. In which direction would the aircraft fly to reach the main bang?

.....

West

270

The radar scope displays the location of an aircraft in relation to the main bang.



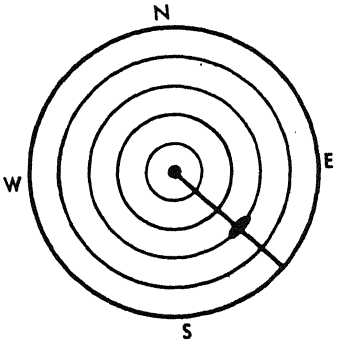
In the above illustration, what direction is the aircraft from the main bang.

.....

Southwest

271

A radar scope also provides distance information to the controller.



In the above picture the airplane is 30 miles from the main bang. How far apart are the range markers?

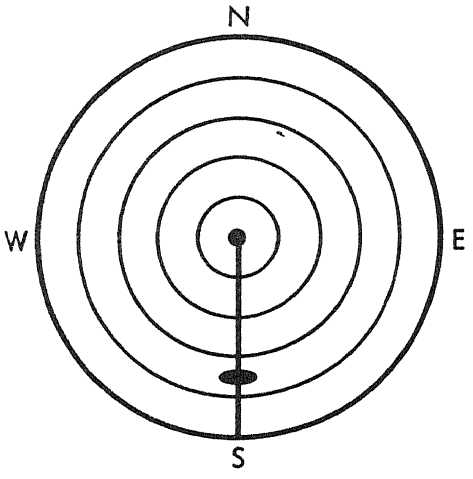
.....

---

10 miles

272

A radar scope furnishes the actual position of an aircraft to the air traffic specialist.



In the illustration above, what direction is the aircraft from the main bang?

.....

South

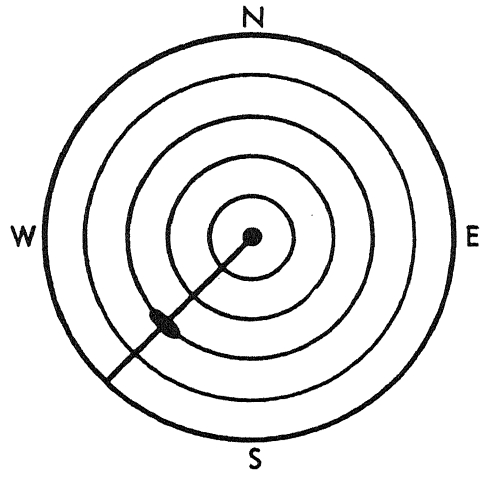
273

In the preceding illustration the range markers are spaced 10 miles apart. In which direction and how far would the aircraft have to fly to reach the "main bang"?

.....

North - 35 miles

274



In the above illustration the range markers are 5 miles apart. What is the direction and distance of the aircraft from the main bang?

Southwest - 15 miles

275

Which of the following does radar provide about an aircraft?

..... A. Direction and height.

..... B. Distance and height.

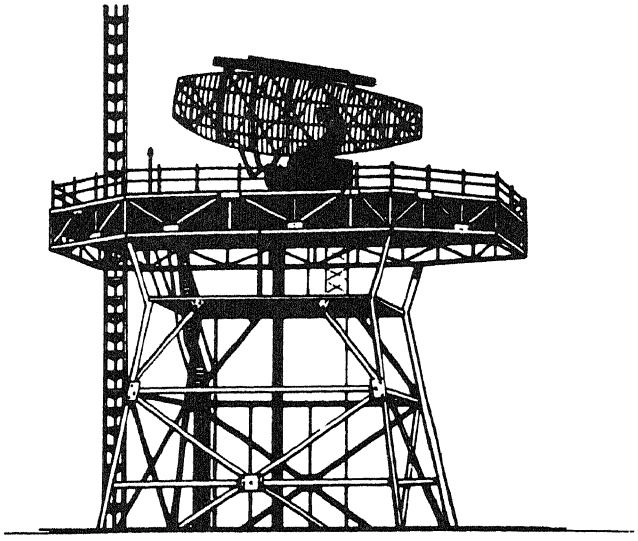
..... C. Direction and distance.

..... D. Distance and speed.

C.

276

The en route center long range radar is called air route surveillance radar (ARSR).

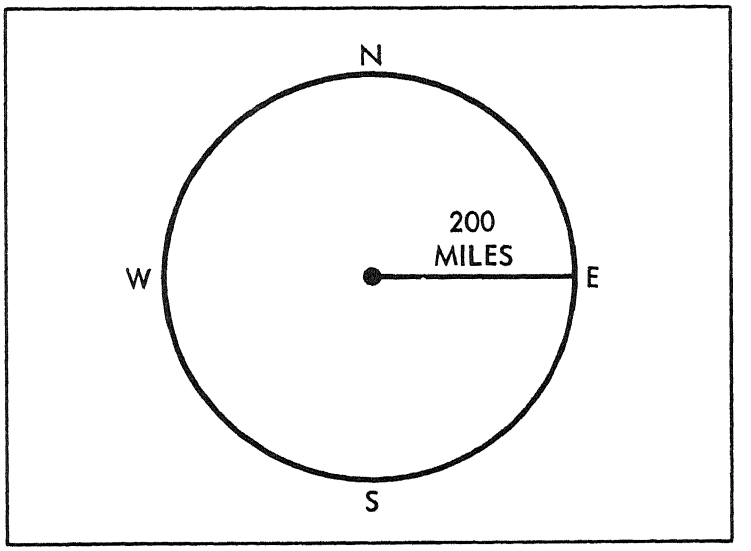


In normal operation, where is the ARSR main bang located on the radar scope?

.....

In the center of the scope.

277



ARSR SCOPE

What is the distance from north to south on the ARSR scope shown above?

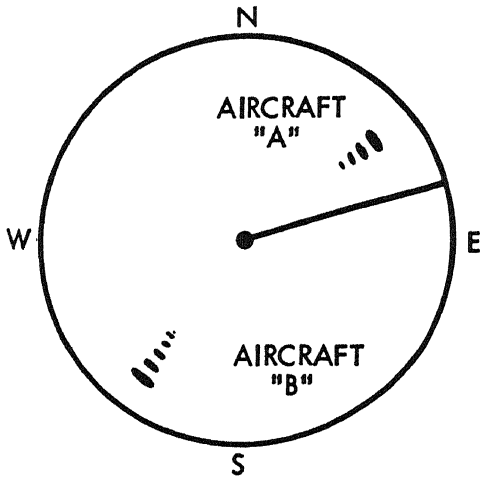
.....

---

400 miles

278

ARSR scopes show the controller the present location of the aircraft as well as a trail indicating several moments of elapsed flight. The largest and brightest target represents the current position of the aircraft.



From the above illustration give the direction of flight for each aircraft.

.....

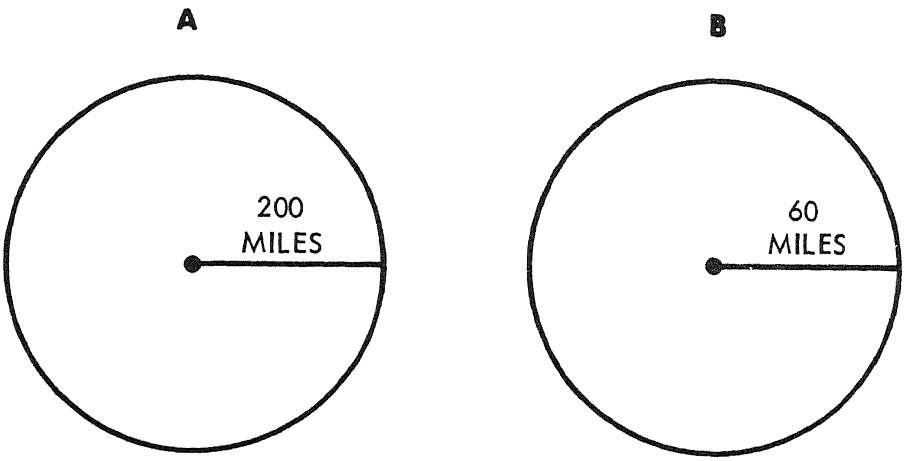
.....

---

1. Aircraft A - Northeast-bound
2. Aircraft B - Southwest-bound

279

RADAR SCOPES



Identify the type of facility which uses:

A. .....

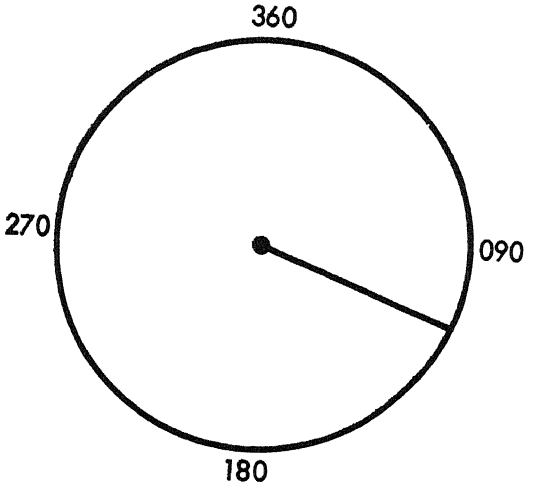
B. .....

A. Centers

B. Towers

280

The radar equipment used at a terminal facility is called airport surveillance radar (ASR). The radar equipment works on the same principle as air route surveillance radar.



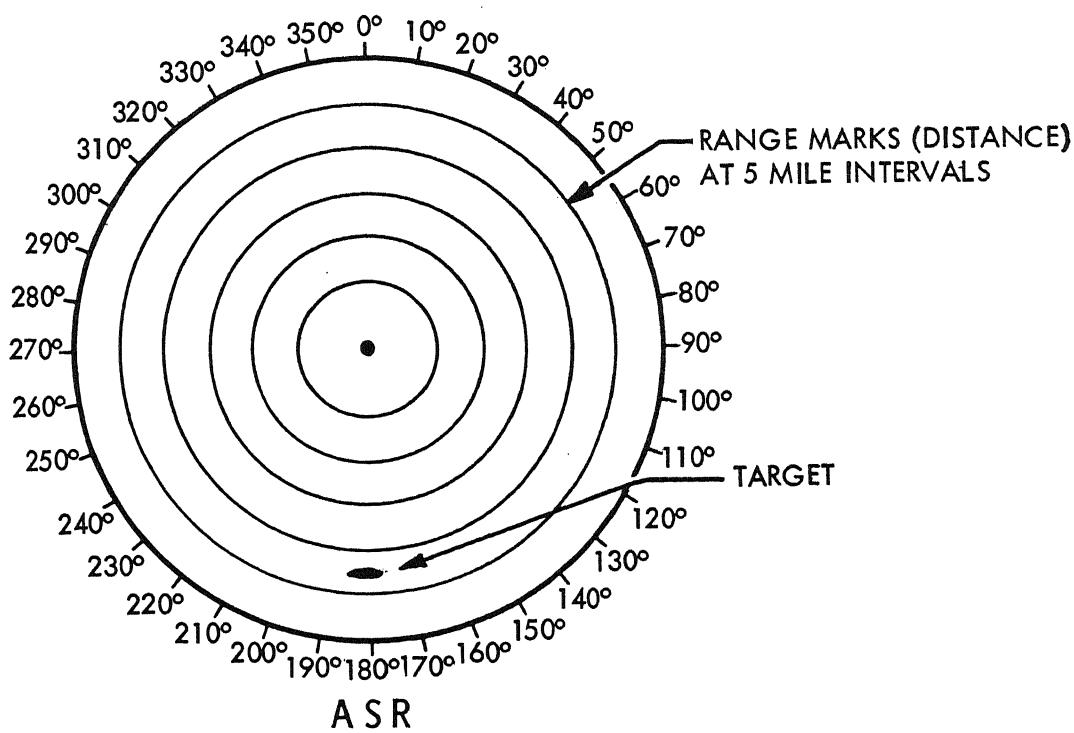
What items of information about an aircraft does the above ASR scope provide for the specialist?

.....

Distance (range) and direction (azimuth) information.

281

In the illustration below magnetic headings from 0° to 350° surround the edge of the ASR scope. This is known as a compass rose.

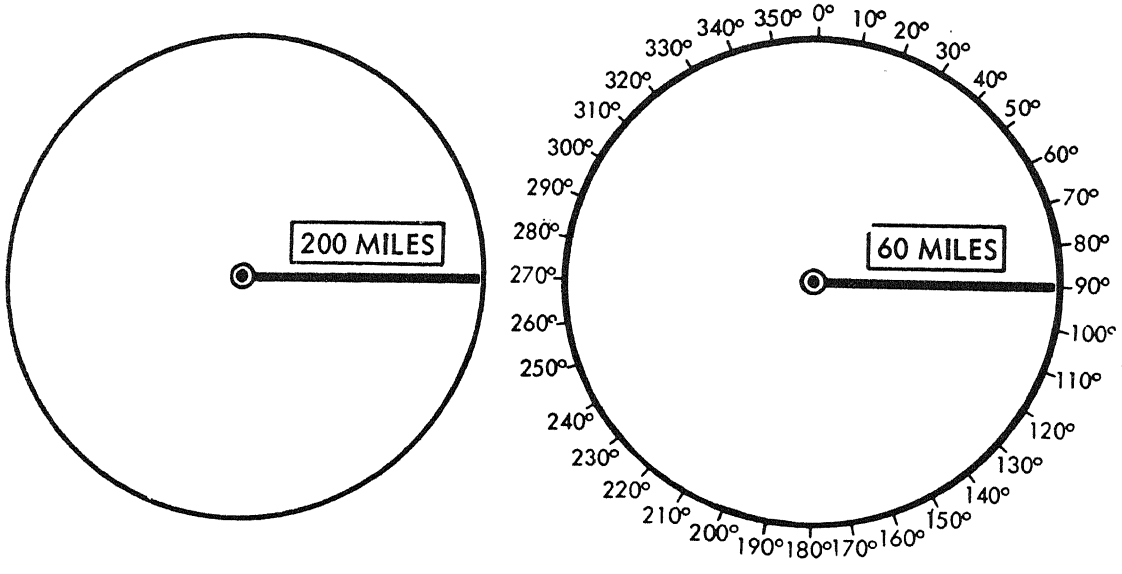


What is the target position in the distance and degree?

.....

---

23 miles at 180 degrees from the main bang.

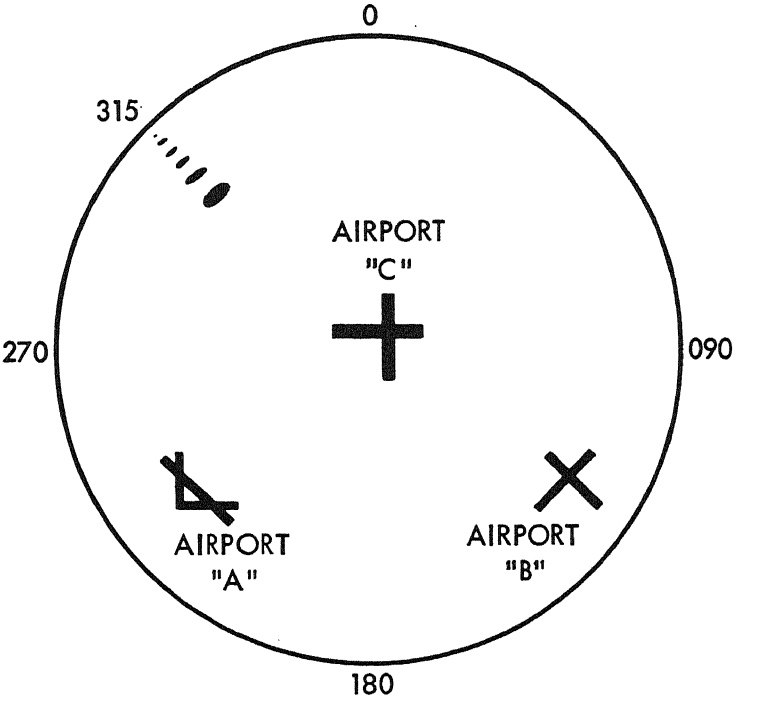


What feature appears on the ASR scope that is not a part of the ARSR scope pictured above?

.....

A compass rose.

3



On the above ASR scope, the controller has identified the target shown. The pilots destination is airport "A" and the aircraft is presently on a 135-degree heading. What direction (in degrees) would the controller have the pilot fly to reach his destination?

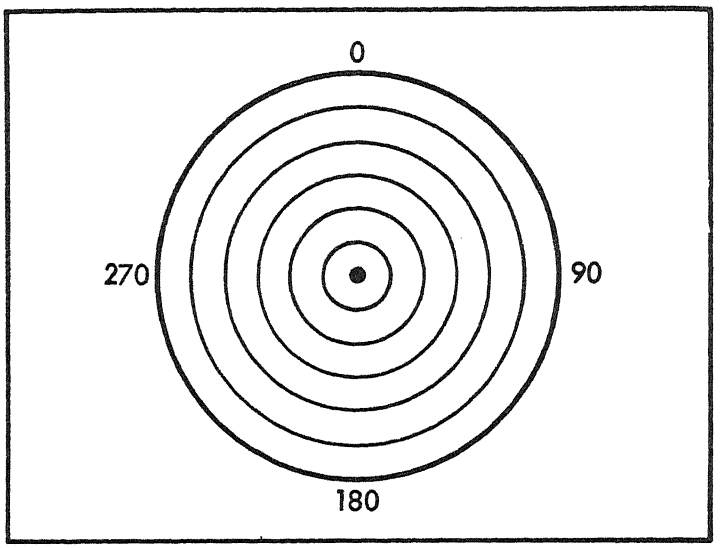
.....

---

180 degrees

284

Radar detects aircraft in all directions. The illustration below shows an ASR scope at maximum range.



What is the distance between the range marks in the above picture?

.....

---

10 miles

285

What is the maximum distance an aircraft may be from an ASR antenna and still appear on the scope?

.....

---

60 miles

286

A terminal radar controller uses a scope placed in a slanted position.

What type of radar equipment is shown in the above illustration?

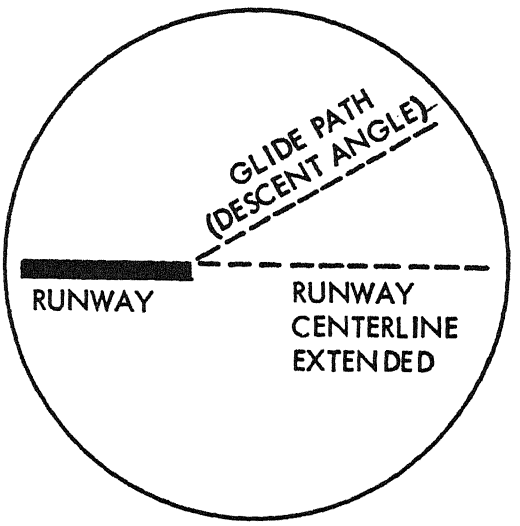
..... A. ASR

..... B. ARSR

A.

287

A few terminal facilities use precision approach radar (PAR). This type of radar provides direction, distance, and height information to the specialist.



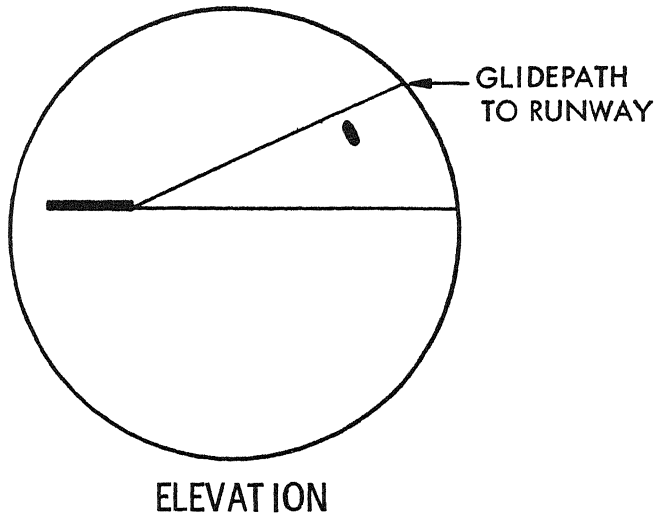
What additional information about an airplane does PAR give to the controller that ASR does not provide?

.....

Height of aircraft

288

PAR provides height information concerning an aircraft above or below a predetermined glidepath.



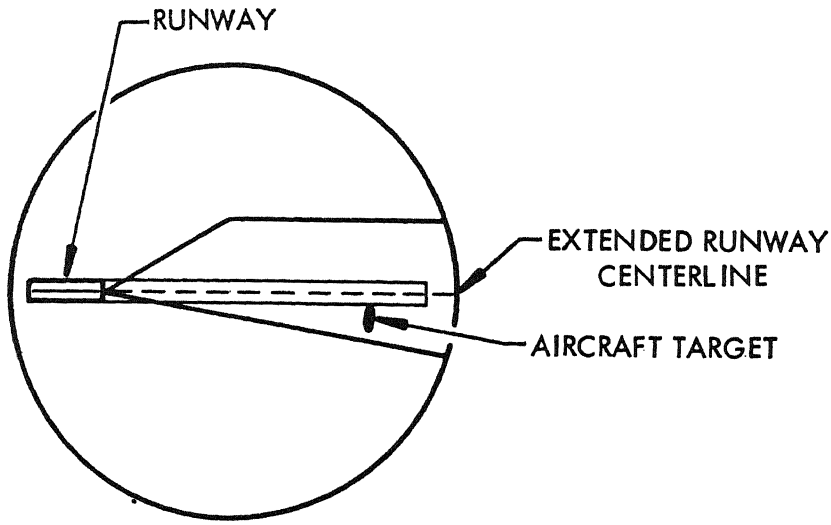
In the above illustration is the aircraft above or below the glidepath?

.....

Below

289

PAR provides directional information about an aircraft in relation to the extended runway centerline.



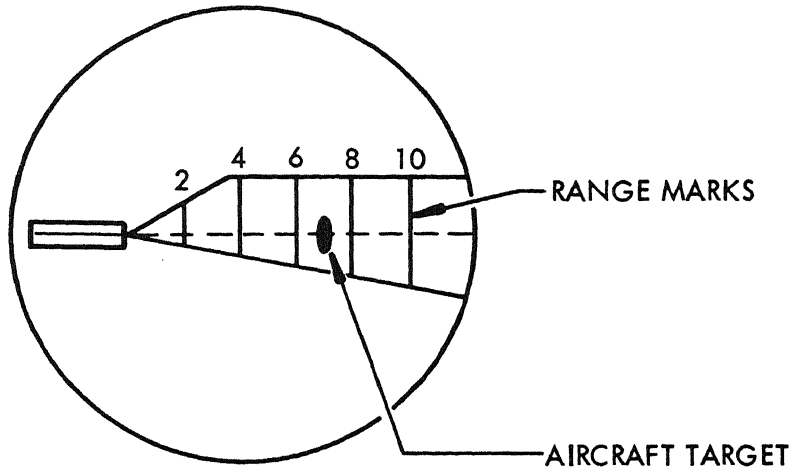
In the above picture, in which direction would the aircraft turn in order to return on course?

.....

Turn to the right.

290

PAR also provides the controller with the distance in miles of the aircraft from the runway in use. The maximum usable range of PAR is 10 miles.



In the above illustration, how far is the target from the landing runway?

.....

---

7 miles.

291

What information does PAR give to the controller?

.....

.....

.....

Distance

Direction

Elevation

292

Identify the air traffic facilities associated with the following types of radar equipment:

..... A. ASR

..... B. ARSR

..... C. PAR

Terminals A.

Centers B.

Terminals C.

SECTION 9

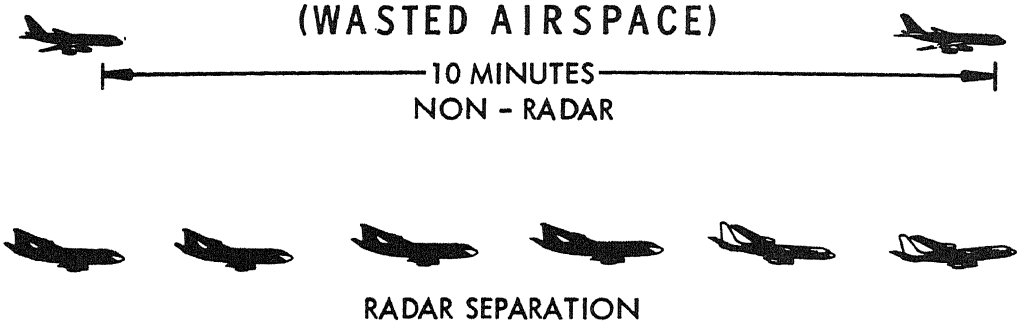
SEPARATION STANDARDS

293

You have seen the various kinds of radar systems used in air traffic control today. The use of radar has greatly increased the specialist's ability to control large numbers of aircraft. Since radar is subject to occasional malfunctions, the specialist must be prepared to continue controlling aircraft using nonradar techniques. These techniques involve the use of specific separation standards and are covered in this section.

294

Nonradar control requires greater airspace separation than radar control. The use of nonradar control results in wasted airspace. The illustration below shows two jets separated by 10 minutes (non-radar) and other jets separated by 5 miles (radar).



295

What is one of the primary advantages of radar control?

.....

Radar enables the controller to place aircraft closer together.

296

The following illustration shows two sets of aircraft being separated by different methods.

Figure A

10 MINUTES SEPARATION

Figure B

5 MILES SEPARATION

A. Radar control is represented in Figure .....

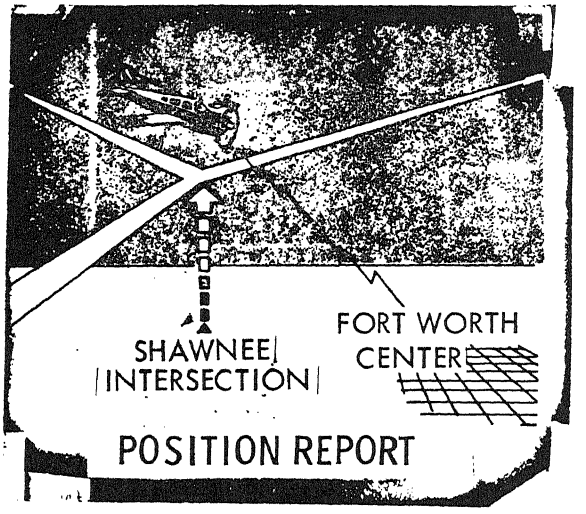
B. Nonradar control is represented in Figure .....

A. Figure B

B. Figure A

297

When nonradar control is being used, the controller uses strips on a board and relies on position reports from pilots to determine the aircraft's position. Since there is the possibility of human and instrument error in position calculation, the separation required between two aircraft under nonradar control is much greater than required for radar control.



In the above figure the pilot reports to Fort Worth Center over the Shawnee Intersection. A second aircraft following behind the one shown above on the same route of flight cannot cross Shawnee, at the same altitude, until ten minutes later. This is an example of:

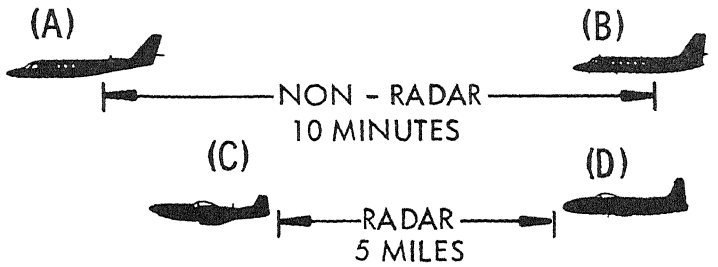
..... A. Radar control

..... B. Nonradar control

B.

298

The illustration below shows two aircraft separated by nonradar and two aircraft separated by radar as it would appear on a scope. In the illustration below, the range markers are five miles apart.



Which pair of aircraft is separated by radar?

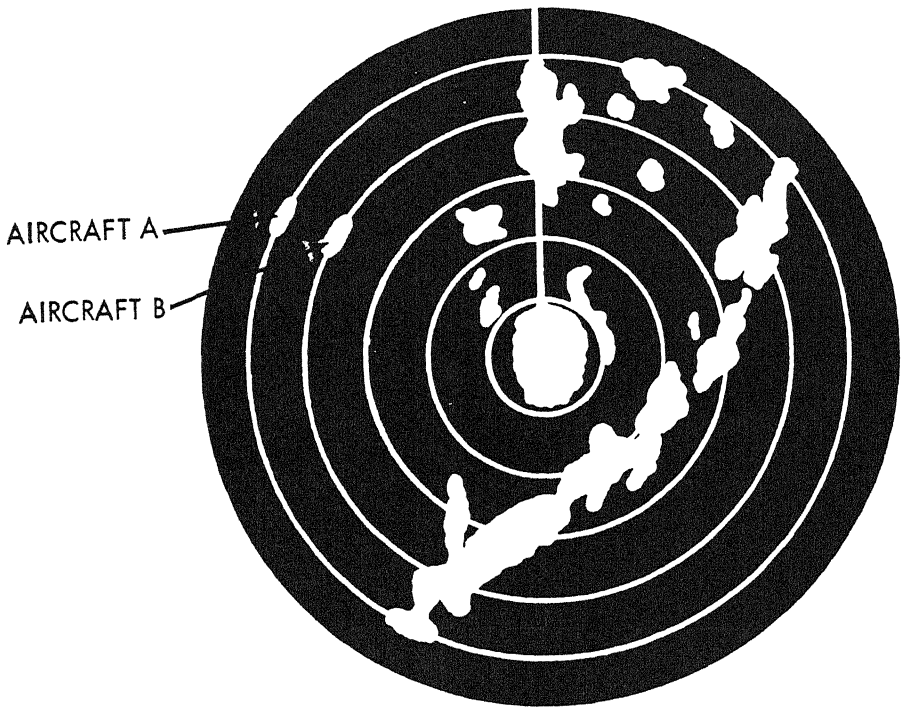
..... A. Aircraft A & B.

..... B. Aircraft C & D.

B.

299

Radar enables a controller to reduce those separation standards required by nonradar control.

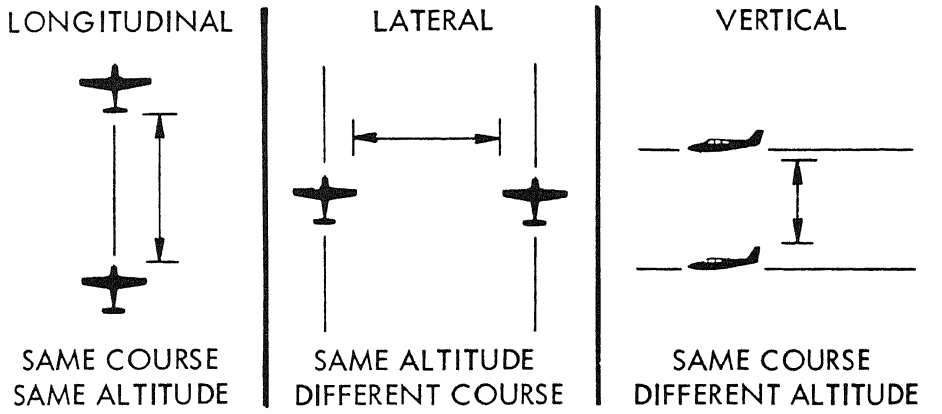


Aircraft A and B are both at the same altitude moving in the same direction. The two aircraft are five miles apart. The controller may keep these aircraft in this close proximity because he is separating them with .....

Radar

300

Several types of nonradar separation are used in providing control services. A controller provides either longitudinal, lateral, or vertical separation to aircraft under his control. Separation standards are designed to keep aircrat from infringing upon the airspace of other aircraft.



TYPES OF SEPARATION

What kind of separation is being used when one aircraft is above the other?

.....

Vertical

301

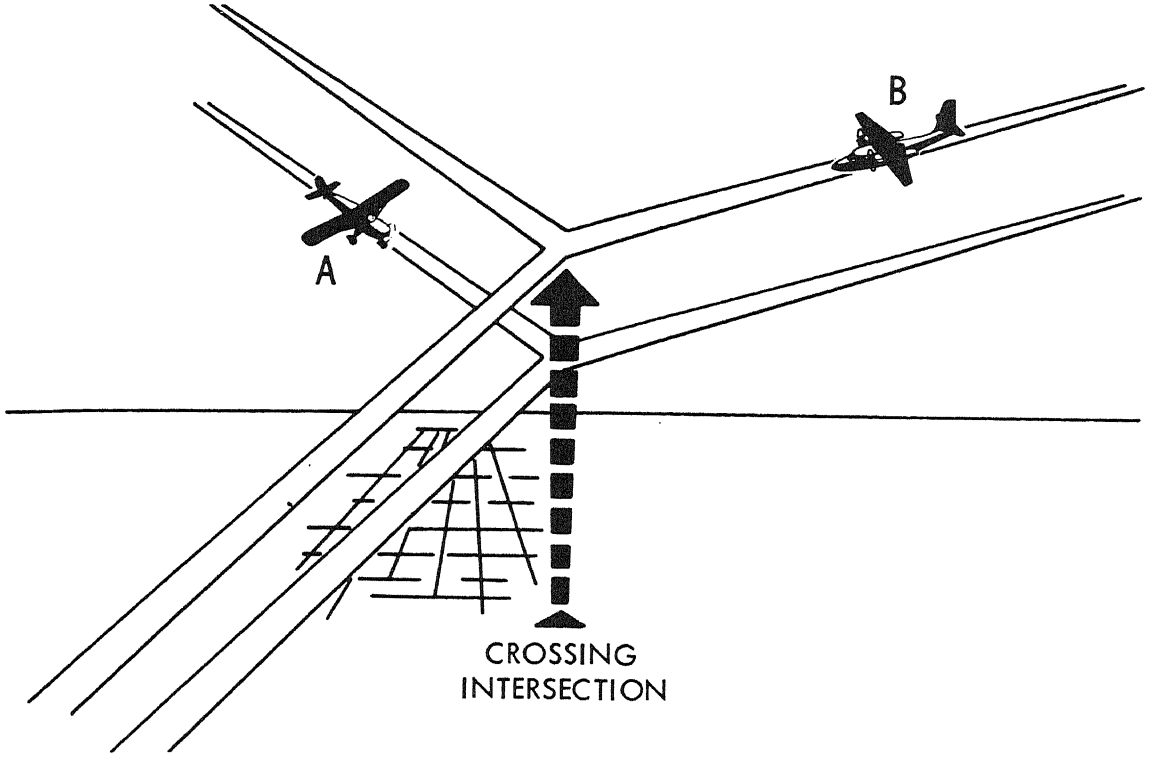
What kind of separation is being used when one aircraft is following another at the same altitude?

.....

Longitudinal

302

Controllers may separate aircraft by assigning different altitudes to pilots flying IFR.

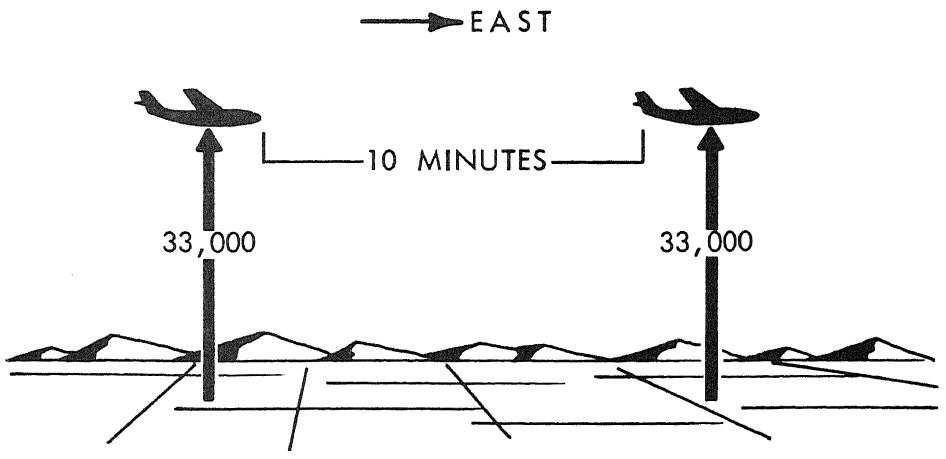


Aircraft "A" is heading southeast-bound at 5,000 feet and aircraft "B" is heading southwest-bound at 6,000 feet. They both arrive at the intersection at the same time. The type of nonradar separation being used is .....

Vertical

303

The picture below illustrates the longitudinal separation of aircraft.



Describe all of the conditions in the above picture which illustrates the principles of longitudinal separation.

.....

.....

.....

---

1. Both aircraft are at the same altitude (33,000).
2. Both aircraft are heading in the same direction (East).
3. The aircraft are separated by 10 minutes flying time.

304

The aircraft in frame 303 are flying at the same altitude and in the same direction. What type of separation does this represent?

.....

Longitudinal separation

305

Two aircraft are flying in the same direction at the same altitude and on the same airway. What additional factor must be considered before the aircraft are longitudinally separated?

.....

Time (in minutes)

306

Name the principles involved in the application of longitudinal separation.

.....

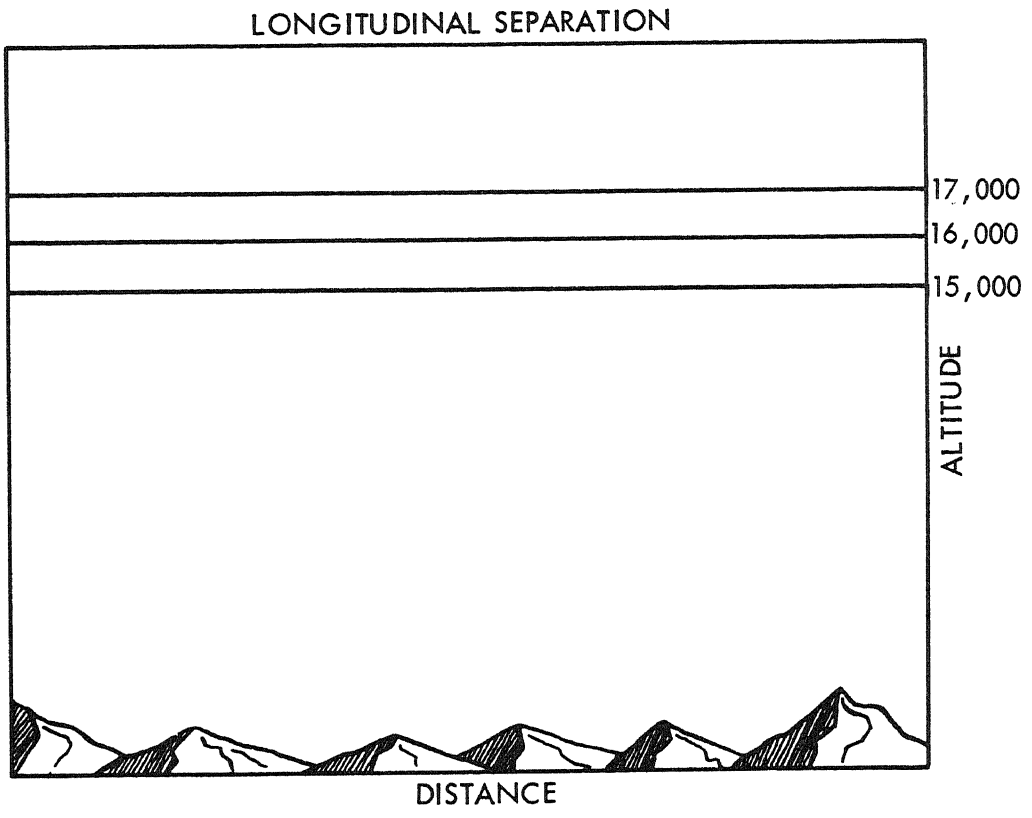
.....

.....

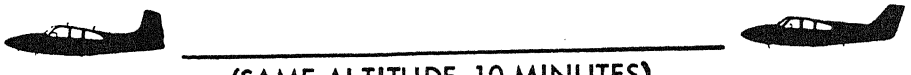
Same altitude of flight

Same direction of flight

Separated by time

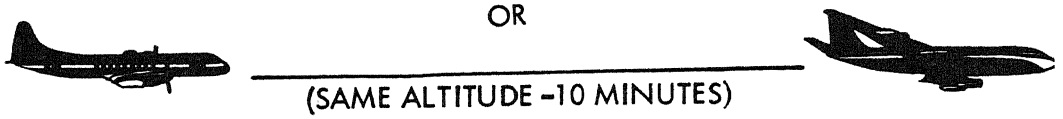


Draw two airplanes in the above picture to illustrate the principles of longitudinal separation.



(SAME ALTITUDE-10 MINUTES)

OR



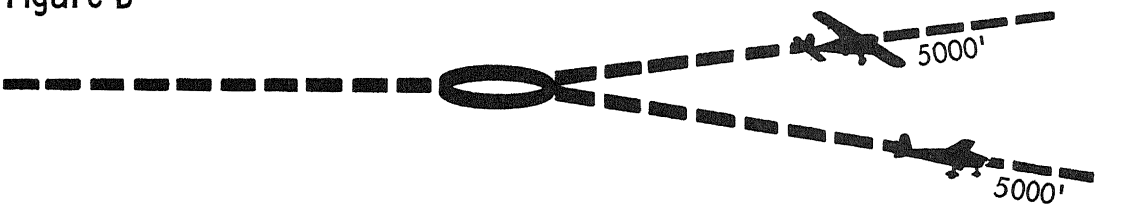
(SAME ALTITUDE -10 MINUTES)

308

In addition to vertical and longitudinal separation, controllers may also use lateral separation. Lateral separation is achieved by assigning aircraft, at the same altitude, different routes of flight.

Figure A

Figure B



The aircraft in the above illustration are the same altitude. Lateral separation is represented in figure .....

B.

309

Two aircraft are flying at the same altitude and in the same direction on different airways. What type of separation is being used?

.....

Lateral separation

310

Two aircraft are flying on the same airway in opposite directions. What type of separation should be used?

.....

Vertical separation

311

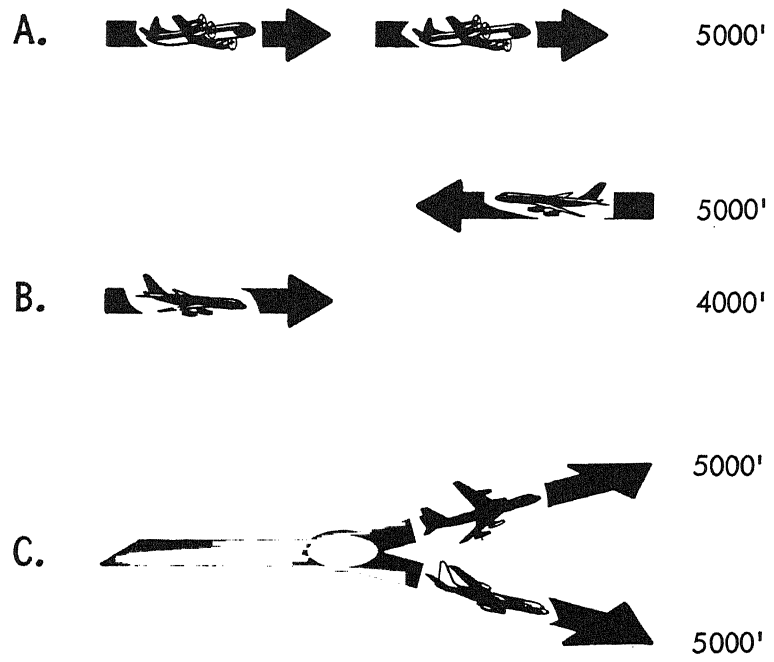
Two aircraft are flying at the same altitude in opposite directions on different airways. What type of separation does this represent?

.....

Lateral separation

312

The three types of nonradar separation a controller may use are illustrated below.



Label each type of separation.

..... A.

..... B.

..... C.

Longitudinal A.

Vertical B.

Lateral C.

SECTION 10

FEDERAL AVIATION REGULATIONS

313

Earlier you learned that pilots must comply with the VFR or IFR rules depending on weather conditions. There are many other rules of flight with which pilots must comply. These rules are contained in the Federal Aviation Regulations. Since knowledge of these regulations is important to the specialist, this section of the workbook will serve to acquaint you with this area.

314

The FAA publishes and distributes the Federal Aviation Regulations (FARs). These regulations originated from the authority established by the Code of Federal Regulations. FARs are divided into parts and contain rules which establish and regulate the Air Traffic Control System. This is the title page of Part 91 of the Federal Aviation Regulations.

Federal Aviation Regulations

PART 91

General Operating and Flight Rules

Published March 1974

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

315

Part 91 of the FARs contains regulations which pertain to the movement of air traffic. As an Air Traffic Control Specialist you will be interested in this part of the FARs.

Part 91—General Operating and Flight Rules

Contents

Contents—Continued

317

What does Subpart B cover? Refer to frame 316.

.....

.....

.....

Flight Rules

318

As an Air Traffic Control Specialist, you are more concerned with Subpart A or Subpart B? Refer to frame 315 and 316.

.....

Subpart B

SAMPLE PAGE OF PART 91, SCAN

so as to see and avoid other aircraft in compliance with this section. When a rule of this section gives another aircraft the right of way, he shall give way to that aircraft and may not pass over, under, or ahead of it, unless well clear.

(b) *In distress.* An aircraft in distress has the right of way over all other air traffic.

(c) *Converging.* When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so) the aircraft to the other's right has the right of way. If the aircraft are of different categories—

(1) A balloon has the right of way over any other category of aircraft;

(2) A glider has the right of way over an airship, airplane or rotorcraft; and

(3) An airship has the right of way over an airplane or rotorcraft.

However, an aircraft towing or refueling other aircraft has the right of way over all other engine-driven aircraft.

(d) *Approaching head-on.* When aircraft are approaching each other head-on, or nearly so, each pilot of each aircraft shall alter course to the right.

(e) *Overtaking.* Each aircraft that is being overtaken has the right of way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.

(f) *Landing.* Aircraft, while on final approach to land, or while landing, have the right of way over other aircraft in flight or operating on the surface. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right of way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land, or to overtake that aircraft.

(g) *Inapplicability.* This section does not apply to the operation of an aircraft on water.

§ 91.69 Right-of-way rules; water operations.

(a) *General.* Each person operating an aircraft on the water shall, insofar as possible, keep clear of all vessels and avoid impeding their navigation, and shall give way to any vessel or other aircraft that is given the right of way by any rule of this section.

(b) *Crossing.* When aircraft, or an aircraft and a vessel are on crossing courses, the aircraft or vessel to the other's right has the right of way.

(c) *Approaching head-on.* When aircraft, or an aircraft and a vessel, are approaching head-on or nearly so, each shall alter its course to the right to keep well clear.

(d) *Overtaking.* Each aircraft or vessel that is being overtaken has the right of way, and the one overtaking shall alter course to keep well clear.

(e) *Special circumstances.* When aircraft, or an aircraft and a vessel, approach so as to involve risk of collision, each aircraft or vessel shall proceed with careful regard to existing circumstances, including the limitations of the respective craft.

§ 91.70 Aircraft speed.

(a) Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.).

(b) Unless otherwise authorized or required by ATC, no person may operate an aircraft within an airport traffic area at an indicated airspeed of more than—

(1) In the case of a reciprocating engine aircraft, 156 knots (180 m.p.h.); or

(2) In the case of a turbine-powered aircraft, 200 knots (230 m.p.h.).

Paragraph (b) does not apply to any operations within a Terminal Control Area. Such operations shall comply with paragraph (a) of this section.

(c) No person may operate aircraft in the airspace beneath the lateral limits of any terminal control area at an indicated airspeed of more than 200 knots (230 m.p.h.).

However, if the minimum safe airspeed for any particular operation is greater than the maximum speed prescribed in this section, the aircraft may be operated at that minimum speed.

§ 91.71 Acrobatic flight.

No person may operate an aircraft in acrobatic flight—

(a) Over any congested area of a city, town, or settlement;

(b) Over an open air assembly of persons;

(c) Within a control zone or Federal airway;

(d) Below an altitude of 1,500 feet above the surface; or

(e) When flight visibility is less than three miles.

For the purposes of this section, acrobatic flight means an intentional maneuver involving an abrupt change in an aircraft's attitude, an abnormal attitude, or abnormal acceleration, not necessary for normal flight.

§ 91.73 Aircraft lights.

No person may, during the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of three statute miles or the sun is more than six degrees below the horizon)—

(a) Operate an aircraft unless it has lighted position lights;

(b) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft—

(1) Is clearly illuminated;

(2) Has lighted position lights; or

(3) Is in an area which is marked by obstruction lights; or

(c) Anchor an aircraft unless the aircraft—

(1) Has lighted anchor lights; or

(2) Is in an area where anchor lights are not required on vessels.

§ 91.75 Compliance with ATC clearances and instructions.

(a) When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless he obtains an amended clearance. However, except in positive controlled airspace, this paragraph does not prohibit him from cancelling an IFR flight plan if he is operating in VFR weather conditions.

(b) Except in an emergency, no person may, in an area in which air traffic control is exercised, operate an aircraft contrary to an ATC instruction.

(c) Each pilot in command who deviates, in an emergency, from an ATC clearance or instruction shall notify ATC of that deviation as soon as possible.

(d) Each pilot in command who (though not deviating from a rule of this subpart) is given priority by ATC in an emergency, shall, if requested by ATC, submit a detailed report of that emergency within 48 hours to the chief of that ATC facility.

§ 91.77 ATC light signals.

ATC light signals have the meaning shown in the following table.

Color and type of signal	Meaning with respect to aircraft on the surface	Meaning with respect to aircraft in flight
Steady green	Cleared for takeoff	Cleared to land.
Flashing green	Cleared to taxi	Return for landing (to be followed by steady green at proper time).
Steady red	Stop	Give way to other aircraft and continue circling
Flashing red	Taxi clear of runway in use.	Airport unsafe—do not land.
Flashing white	Return to starting point on airport.	Not applicable.
Alternating red and green.	Exercise extreme caution.	Exercise extreme caution.

§ 91.79 Minimum safe altitudes; general.

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes:

(a) *Anywhere.* An altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface.

(b) *Over congested areas.* Over any congested area of a city, town, or settlement, or over any open air assembly of persons, an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

321

What is the subject of paragraph 91.69? Refer to frame 319.

.....

Right of way rules, water operations.

322

What subject is covered under paragrpah 91.5? Refer to frame 315.

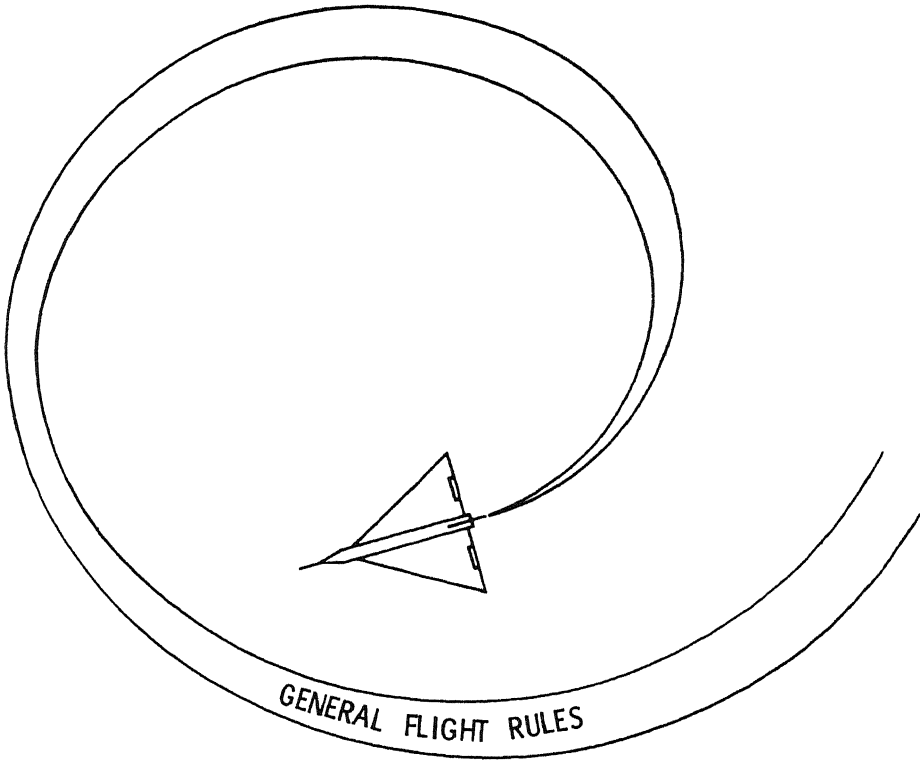
.....

Preflight action

323

General operating and flight rules define the actions and responsibilities of pilots in their conduct and operation of aircraft. These rules state the requirements for aircraft right of way, operating in an unsafe manner, acrobatic flights, fuel requirements, etc.

324



Volume VI, Part 91 - General Operating and Flight Rules contain which of the following subjects?

..... A. Flight Rules

..... B. Controllers' responsibilities

..... C. Pilots' responsibilities

..... D. Visual Flight Rules (VFR)

..... E. Instrument Flight Rules (IFR)

A.

C.

D.

E.

325

What does Part 91.3 cover? Refer to frame 315.

.....

Responsibility and authority of the pilot in command.

326

What does Part 91.75 cover? Refer to frame 316.

.....

Compliance with ATC clearances and instructions.

327

When may a pilot deviate from a clearance? Refer to frame 320.

..... A. At his discretion

..... B. In an emergency

..... C. Under no conditions

B.

328

FAA encourages VFR pilots to contact Air Route Traffic Control Centers, Towers, and Flight Service Stations for traffic advisory service. It is, therefore, necessary for an Air Traffic Control Specialist to be aware of the pilot's requirements for VFR flight.

329

FAR Part 65 covers certification of airmen, other than flight crew members, and air traffic control tower operators. Illustrated below is the title page of Part 65.

Federal Aviation Regulations

PART 65

Certification: Airmen Other Than Flight Crewmembers

Published September 1974

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

330

By now, you should have received a medical certificate like the one below.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

MEDICAL CERTIFICATE SECOND CLASS

THIS CERTIFIES THAT (Full name and address)

JOHN Q. PUBLIC
2241 S. W. 18th
Oklahoma City, Oklahoma 73129

DATE OF BIRTH	HEIGHT	WEIGHT	HAIR	EYES	SEX
5-6-70	67"	185	Blonde	Blue	Male

has met the medical standards prescribed in Part 67, Federal Aviation Regulations for this class of Medical Certificate.

LIMITATIONS: None

DATE OF EXAMINATION: 10 June 1976
EXAMINER'S SERIAL NO.: 0876-056-1

EXAMINER — SIGNATURE: John H. Doe, M.D.
TYPED NAME: John H. Doe, M.D.

AIRMAN'S SIGNATURE: John Q. Public

FAA FORM 8500-9 (1-67) SUPERSEDES FAA FORM 1004-1

CONDITIONS OF ISSUE

This certificate shall be in the personal possession of the airman at all times while exercising the privileges of his airman certificate. Unless modified or recalled within 60 days from date of issue, this certificate becomes valid for the time limits specified below:

a. FIRST CLASS – SIX calendar months for those operations requiring a First Class Medical Certificate; TWELVE calendar months for those operations requiring only a Second Class Medical Certificate; or, TWENTY-FOUR calendar months for those operations requiring only a Third Class Medical Certificate.

b. SECOND CLASS – TWELVE calendar months for those operations requiring a Second Class Medical Certificate; or, TWENTY-FOUR calendar months for those operations requiring only a Third Class Medical Certificate.

c. THIRD CLASS – TWENTY-FOUR calendar months for those operations requiring a Third Class Medical Certificate.

OPERATION DURING PHYSICAL DEFICIENCY

The holder of this certificate is governed by the provisions of FAR Secs. 61.45, 63.19, and 65.45(c) relating to physical deficiency.

NOTICE

Any alteration of this certificate is punishable by a fine not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

A second class medical certificate is valid for 12 months and expires on the last day of the month in which issued. Look at the illustration above. When does the certificate expire?

---

10 June 1977

331

Part 71 of the FARs covers the designation of Federal Airways, Area Low Routes, Controlled Airspace, and Reporting Points. This is the title page of Part 71.

Federal Aviation Regulations

PART 71

Designation of Federal Airways, Area Low Routes, Controlled Airspace, and Reporting Points

Published January 1975

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

332

Which publication contains information concerning a pilot's responsibilities for operating aircraft within the United States?

.....

FARs

333

A thorough knowledge of FARs is necessary so that Air Traffic Control Specialists will not issue instructions which could cause a pilot to violate these regulations. You have learned that the FARs contain the rules and policies which regulate the Air Traffic Control System. Many other directives and manuals have been developed to expand upon the FARs. You must become familiar with these additional publications which govern the operation of the Air Traffic Control System.

SECTION 11

FAA HANDBOOKS AND PUBLICATIONS

334

As an Air Traffic Control Specialist you will be guided in many cases by written instructions in the form of handbooks. In this section you will be given examples of many of the handbooks you will use in your training and career in Air Traffic Service.

Section 11

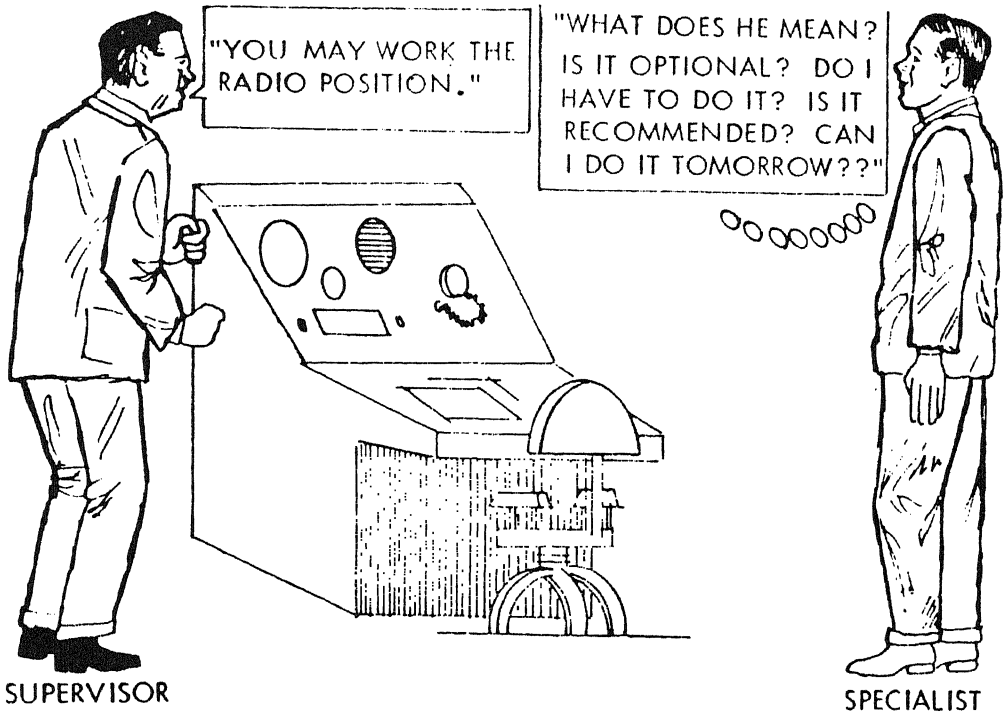
FAA HANDBOOKS AND PUBLICATIONS

335

As an Air Traffic Control Specialist you will be guided in many cases by written instructions in the form of handbooks. So that all specialists will interpret these publications in the same manner, it is important to learn the specific meaning of certain words and phrases as used in these handbooks. In this section you will be given examples of specific word usage.

336

Certain words in FAA Handbooks are assigned specific meanings so that all Air Traffic Control Specialists will interpret them in the same manner.



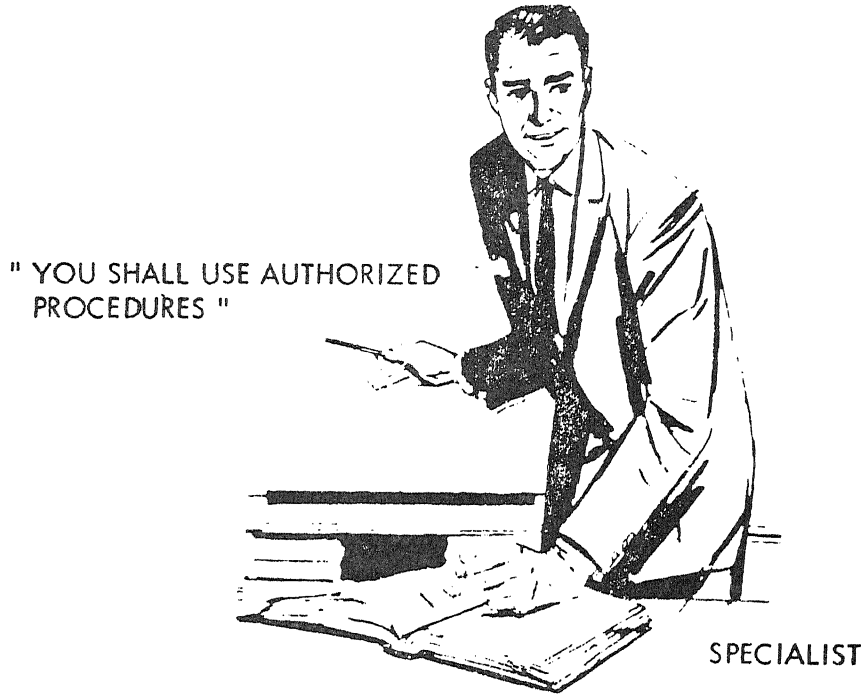
What is the possible consequence of using words whose meanings are not clearly defined?

.....

Misinterpretation

337

"Shall" means a procedure is mandatory.



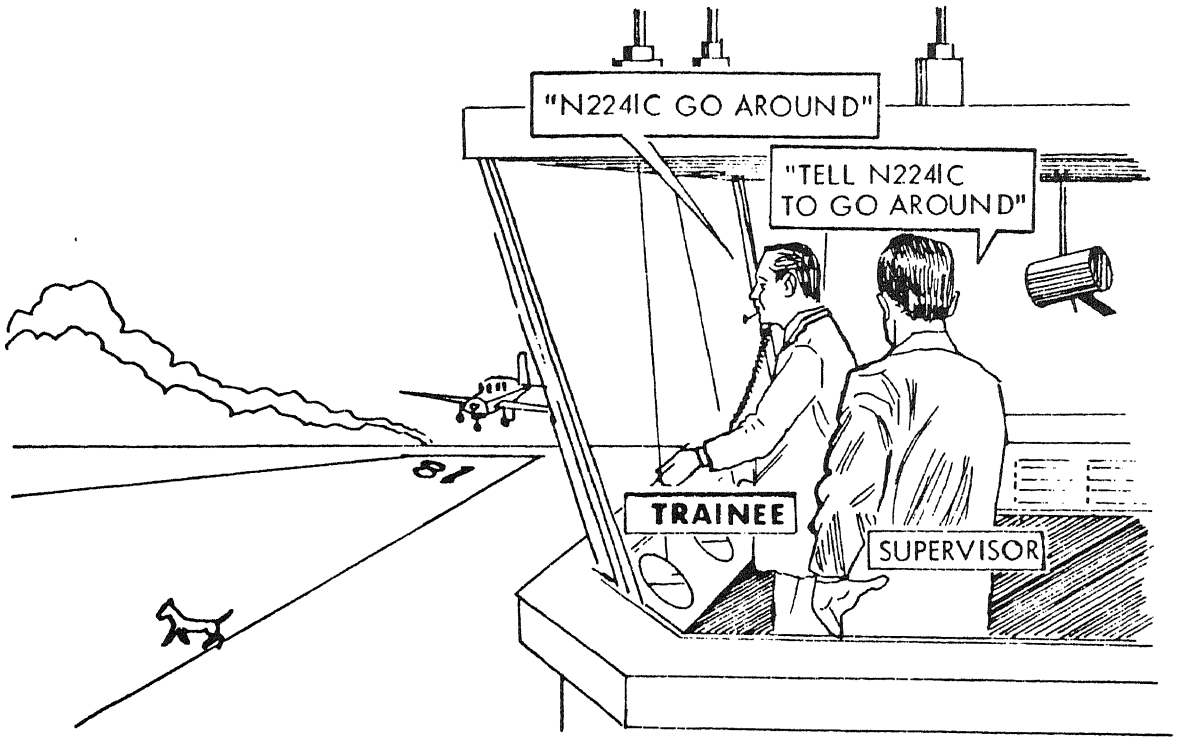
Look at the illustration. Which words indicate a mandatory procedure?

.....

Shall use

338

Sometimes the word shall is not spoken but is implied.



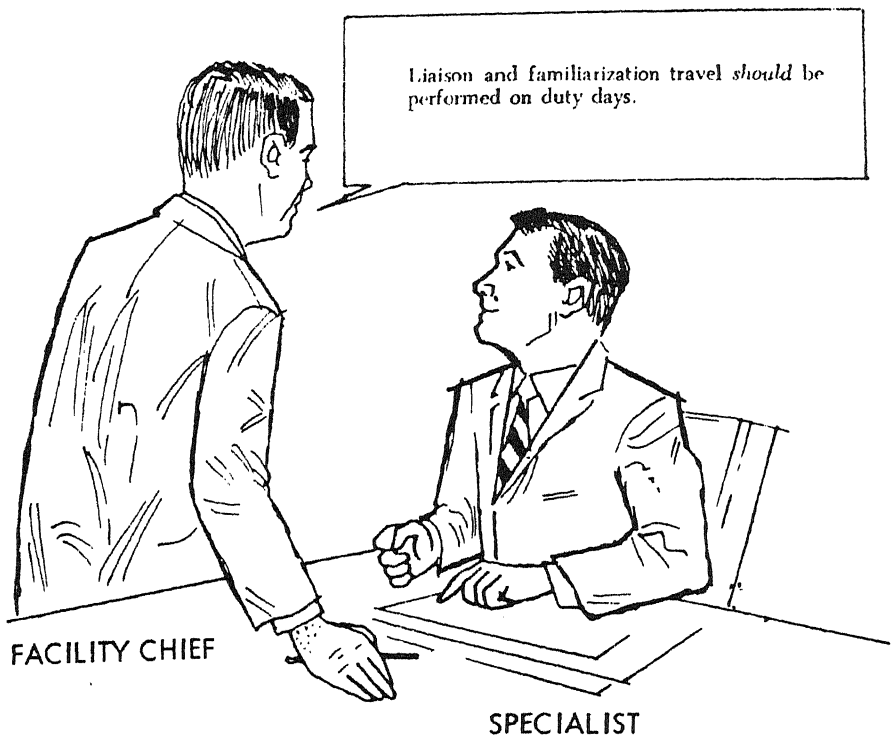
Refer to the illustration.
Is it optional, mandatory, or recommended that the specialist issue a go around?

.....

Mandatory

339

Should means a procedure is recommended.



Refer to the illustration.
Is the above instruction recommended, mandatory, or optiona

.....

Recommended

340

Which passage indicates a recommended procedure?

..... A. "... Inspect facility bulletin board, binder, and other optional data as specified by the facility chief."

..... B. "The facility chief may assign supplementary duties to any of the positions of operation."

..... C. "Regional offices should inform the NFDC if they desire to use a location identifier not presently recognized by the ADIS."

C.

341

May and need not means a procedure is optional.

Look at this statement:

"A single frequency may be used for more than one function when it is operationally advantageous, such as when operating positions are combined."

Which word indicates that the above procedure is optional?

.....

---

may

342

Look at this statement:

Some specialists need not be guided by the instructions.

This statement indicates a procedure which is:

..... A. Recommended

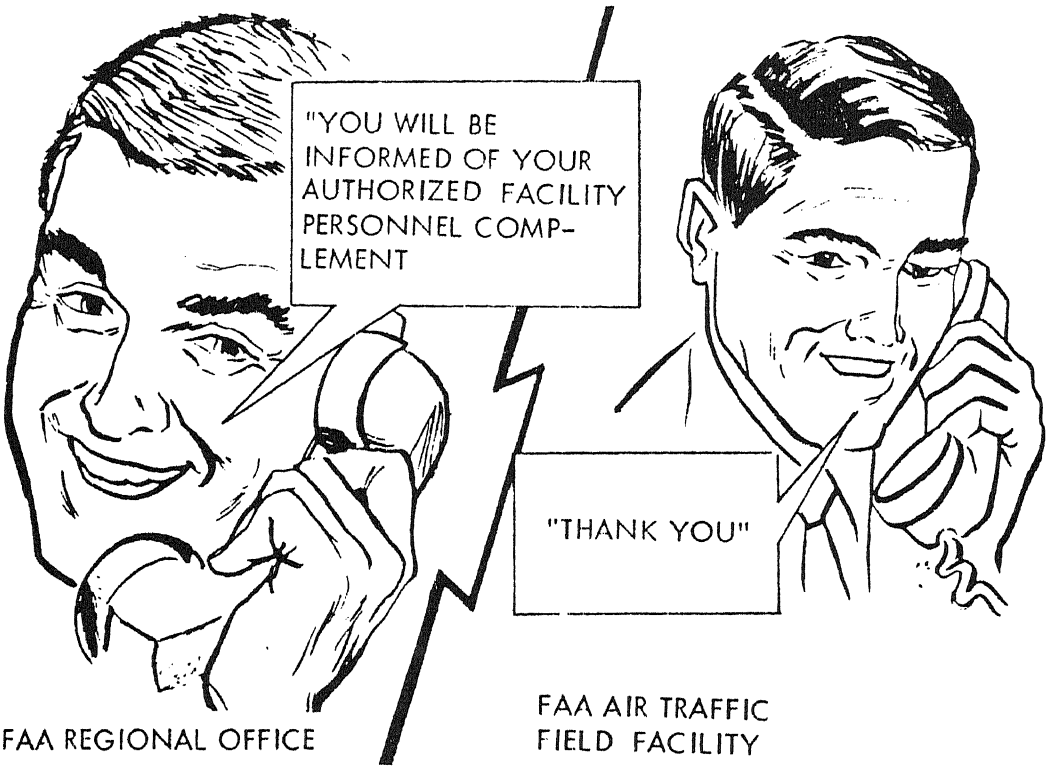
..... B. Mandatory

..... C. Optional

C.

343

Will, indicates futurity. It does not mean that application of a procedure is required.



The supervisor in the field facility knows that the conversation with the area office reflects:

..... A. A mandatory procedure.

..... B. An optional procedure.

..... C. A procedure which indicates futurity.

C.

344

Indicate whether the following statements reflect a mandatory procedure (M), a recommended procedure (R), an optional procedure (O), or futurity (F).

..... A. "Provide air traffic control service to IFR and special VFR aircraft operating within controlled airspace and for which control responsibility has been received."

..... B. "You may use as a holding fix a location which the pilot can determine by visual reference to the surface if he is familiar with it."

..... C. "Each employee should be familiar with the duties of his particular position and with the duties of subordinate employees."

..... D. "The Washington Office will disseminate a summary of these improvement techniques to the regional offices for their information and optional adoption."

M A.
.....

O B.
.....

R C.
.....

F D.
.....

345

Aircraft means the airframe, crew members, or both. It can be used in the singular or plural sense.

When it is necessary to make a hurried, brief transmission of traffic information, you may omit aircraft type.

As used in the above example, aircraft means:

..... A. The crew members.

..... B. The airframe.

..... C. The crew members and the airframe.

..... D. All of the above.

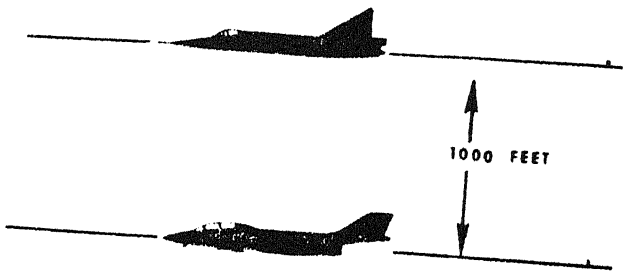
D.

346

Approved separation means the minimum allowable separation between two or more aircraft when Air Traffic Control is being exercised.

Consider this statement:

Aircraft being separated vertically shall be separated by at least 1000 feet.



Now answer the following:

A controller has been told to use approved separation when separating those two aircraft.

He knows that:

..... A. He should separate the aircraft by at least 1000 feet.

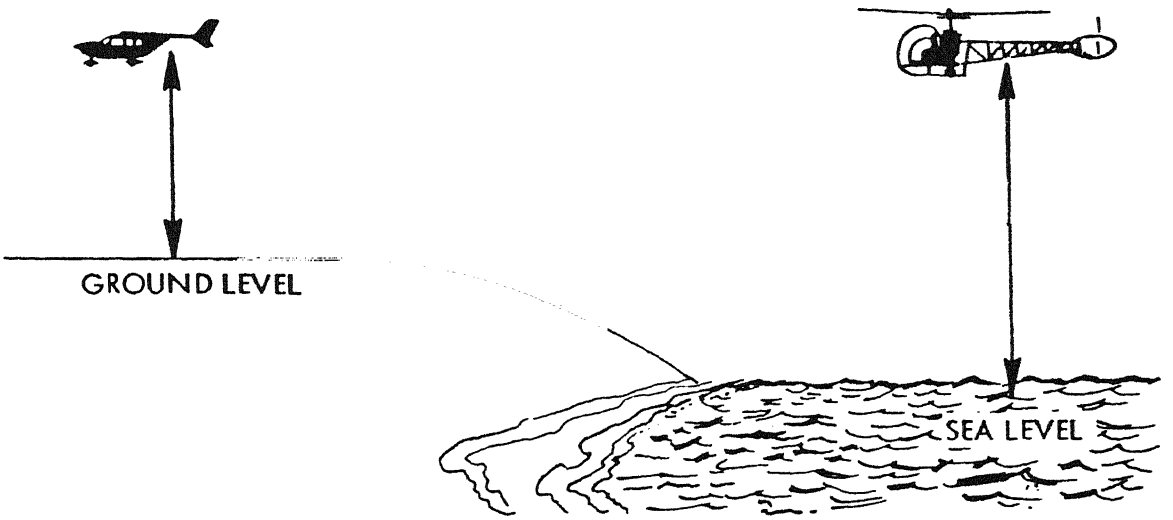
..... B. He must separate the aircraft by at least 1000 feet.

..... C. He may use his judgment in determining how much separation to apply.

B.

347

Altitude refers to any given vertical distance.



Which of the following illustrate the above statement:

..... A. An aircraft flying 500 feet above the terrain.

..... B. An aircraft flying 2000 feet above the clouds.

..... C. An aircraft at flight level 180.

..... D. An aircraft maintaining an altitude of 3000 feet above sea level.

A.

B.

C.

D.

348

Miles means nautical miles unless otherwise indicated.

Indicate which of the following refer to nautical miles:

..... A. "We have five miles separation between th two aircraft."

..... B. Visibility, as used in weather observations, is reported in statute miles.

..... C. "The normal station flight service area includes an area within 400 miles of the station."

..... D. "Avoid flight within five nautical miles if at this altitude."

A.

C.

D.

349

Notes are statements of fact, of a prefactory or explanatory nature, which relate to the use of directive material. Notes are identified by the notation "(N)".

..... A. "...state the name of the military service, followed by the name of the military facility and the word tower. (E)"

..... B. "...the preceding aircraft has departed and passed the intersection or is airborne and turning to avert any conflict. (I)"

..... C. "The transferring controller shall forward this data to the receiving controller."

..... D. "If your facility performs an en route control function, broadcast a SIGMET alert once on all frequencies serving the en route traffic. (N)"

350

Certain symbols indicate that text-related information appears in the right-hand column.

Examples are identified by the symbol "(E)".

Which statement indicates that an example appears in the righ-hand column?

..... A. "...use the accompanying table to determine the lowest useable flight level to clear aircraft at or above 18,000 feet msl. (T)"

..... B. "Where military and civil airports are located in the same general area and have similar names, state the name of the military service, followed by the name of the military facility and the word tower. (E)"

..... C. "If the approaching aircraft is on a different frequency, inform it of the aircraft taxiing into position."

..... D. "Each page will show the change number and effective date of the change."

B.

351

Illustrations are identified by the symbol "(I)":

Which of the following indicates that an illustration appears in the right-hand column?

..... A. "...A preceding, arriving aircraft has taxied off the runway. (I)"

..... B. "Include traffic information with the landing clearance."

..... C. "Operate runway centerline and touchdown zone light in accordance with the accompanying intensity setting table, when any of the following conditions exist: (T)..."

..... D. "Apply RVR landing minima, without regard to ceiling, if the approach and sequenced flashing lights are on and operating."

A.

352

References to published material are identified by the symbol "(R)".

Which of the following indicates that a reference appears in the right-hand column?

..... A. "Clear an aircraft for a contact approach only when the pilot has requested it and the reported ground visibility is at least 1 statute mile."

..... B. "In establishing aircraft in landing sequence you should not assign sequence numbers. (N)"

..... C. "Identify the aircraft before taking action to position it in the landing sequence."

..... D. "Broadcast a terminating advisory at the end of the advisory period. (R)"

D.

353

Tables of related information are identified by the symbol "(T)".

Which of the following indicates that a table appears in the right-hand column?

..... A. "Issue to aircraft only factual information as reported by the airport management concerning the condition of the runway surface, describing the accumulation of precipitation. (E)"

..... B. "Where RCR's are provided, transmit this information to all arriving USAF and ANG aircraft and to other aircraft when the pilot requests. (N)"

..... C. "Operate runway centerline and touchdown zone lights in accordance with the accompanying intensity table, when any of the following conditions exist: (T)..."

..... D. "858. AVOIDANCE OF AREAS OF NUCLEAR RADIATION (R)"

C.

354

Occasionally two or more symbols appear after the text and indicate that more than one type of explanatory information appears in the right-hand column.

Identify the symbols that appear at the end of each example:

A. "Clear aircraft at altitudes or flight levels according to the accompanying table: (T)(E)..."

B. "Where adequate radar coverage exists, radar facilities may vector aircraft to the final approach course in accordance with 671. (N)(E)"

C. "Use information from the accompanying table as a guide to determine the maximum interception angles when vectoring aircraft to intercept a final approach coure. (R)(T)"

D. "Military turbojet aircraft may be authorized to make SFO maneuvers if the following conditions are met: (N)(R)(I)..."

A. Table
Example

B. Note
Example

C. Reference
Table

D. Note
Reference
Illustration

355

Handbook changes which involve substantial procedural, operational, or policy changes are identified by the symbol "→"

Which of the following examples indicate a substantial procedural, operational, or policy change?

..... A. "Use radio frequencies for the special purposes for which they are assigned."

..... B. "→c. Transmit message immediately after call-up (without waiting for aircraft reply) when it is short and receipt is assured."

..... C. "Emphasize appropriate digits, letters, or words to aid in distinguishing between similar aircraft identifications."

..... D. "→a. Enter as may be required the following numbered items in the corresponding numbered spaces illustrated above:..."

B.

D.

356

A star "*" preceding a section, paragraph, or subparagraph, denotes one or more military modifications or exceptions to the basic FAA procedure.

Which of the following indicate one or more military modifications or exceptions to the basic FAA procedure?

..... A. "532. APPROACH INFORMATION BY NON-APPROACH CONTROL TOWERS"

..... B. "*533. APPROACH INFORMATION BY APPROACH CONTROL FACILITIES"

..... C. "701. APPROACH INFORMATION"

..... D. "*702. LOST COMMUNICATIONS"

B.

D.

357

The Facility Management Handbook applies to all three air traffic options. This handbook governs the operation and administration of the operating facilities of the Air Traffic Control System. It provides instructions, standards and guidance for facility supervisory personnel.

7210.3B

FACILITY MANAGEMENT

OCTOBER 73

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Service

358

The following is a content page of the Facility Management Handbook.

SCAN

TABLE OF CONTENTS—PART I

Chapter 1. GENERAL

Section 1. APPLICATION

Section 2. REFERENCES

Chapter 2. ADMINISTRATION OF FACILITIES

Section 1. RESPONSIBILITY

Section 2. HOURS OF DUTY

Section 3. WATCH SUPERVISION

359

Below is an example of the Facility Management Handbook.

Section 2. HOURS OF DUTY

65. SERVICES PROVIDED

Air Traffic Control shall be exercised during published hours of operation. However, other air traffic services may be provided outside of published hours of operation.

66. HOURS OF DUTY OF SUPERVISORS

a. Hours of duty performed by facility chiefs and their administrative staffs should ordinarily conform with the hours of duty in use by their regional offices.

b. Facility chiefs, deputy chiefs, facility officers, assistant chiefs, and data systems staffs shall either operate or observe a control position in their facility for a period of at least one hour each week. If currently qualified, may operate the position under general supervision; if not currently qualified, shall operate under direct supervision of a currently qualified controller.

67. BASIC WATCH SCHEDULES

a. Facility chiefs are responsible for preparing watch schedules for their facilities. These schedules shall take into account normal traffic flow, thereby permitting posting a continuing rotational schedule for an indefinite period of time.

b. Facility chiefs shall ensure that Center and Terminal ATCSs assigned to a position of operations:

(1) Do not work more than six consecutive days.

(2) Do not work more than a ten-hour day.

(3) Have an off-duty period of at least eight hours between watches.

68. CONSOLIDATING POSITIONS

Assign facility positions as required by activity, equipment, and duty assignment of the individual facility. Positions may be consolidated in consonance with facility activity and the qualifications of the personnel involved.

69. OVERTIME DUTY

a. Distribution of overtime duty—Facility chiefs shall ensure that overtime duty is equitably distributed among all eligible employees who desire it. Retain overtime duty records for 12 months.

b. Irregular overtime is defined as overtime which cannot be anticipated and scheduled on a regular basis in advance. Employees working irregular overtime may be released when the workload requirement no longer exists.

c. Scheduled overtime is defined as overtime occurring on a regular recurring basis for which employees are scheduled in advance. Scheduled overtime should be used only when there is a known requirement for accomplishing required work and the necessary manpower is not otherwise available. When an employee is working scheduled overtime he will be expected to work the full time for which he is scheduled. If the situation should arise that the services of an employee working scheduled overtime are no longer required and the employee requests early release, he may be released.

70. RELIEF PERIODS

Facility chiefs shall use all available qualified personnel to provide relief periods. First priority should be given to providing a reasonable amount of time away from the position of operations for meals. Additionally, time for such things as briefings and training should be made to rotate work assignments among qualified employees.

71–74. RESERVED

360

What information concerning a facility would you find in Chapter 2? Refer to frame 336.

.....

Administration of Facilities

361

What information regarding your job is contained in paragraph 52? Refer to frame 336.

.....

.....

Sign Off/On Procedures

362

Which of the following can be found in the Facility Management Handbook? Refer to frame 337.

..... A. Overtime duty

..... B. Separation of aircraft

..... C. Basic watch schedules

..... D. Relief periods

A.

C.

D.

363

The Location Identifiers Handbook lists the worldwide and
location identifiers authorized by the Federal Aviation Ad
tion and Canadian Department of Transport. These identifi
required in air traffic and related activities. See examp

LOCATION IDENTIFIERS

JANUARY 15 1975

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Service

The following is a page from the Location Identifiers Handbook. Here, city names are translated into identifiers. Scan:

Location identifiers usually do not exceed three letters, or letter number combinations, and are used to save time in writing, printing, and in allocating space. There are two ways to locate an identifier for an airport or VOR: (1) know the name of the facility and look for the three-letter code, or (2) know the three-letter code and look up the name of the facility. The following are pages from the Location Identifiers Handbook.

SCAN

Jan 15 1975

7350.4C

Location	Ident	Tie In Fac	Cntr Z
Alice, Tex., Alice FSS	ALI		
Alice, Tex., Alice VOR	ALI		
Aliceville, Al. George Downer Field	AIV	BHM	ME
Aliceville, Ala., Aliceville Radiobeacon	AIV	TCL	
Alii, Hawaii Int. (KOA 327-33' UPP 253)	6AI		
Aliquippa, Pa., Aliquippa-Hopewell Airport	8G3	AGC	OB
Alkali, Idaho Int. (BOI 111-51' MUO 066)	4AX		
Allakaket, Ak. Allakaket Airport			
0545-2145 LCL	AET	BTT	AI
2145-0545 LCL	AET	FAI	AI
Allard, La. (Gulf of Mexico) Int. (23-44 089-49)	8AJ		
Allegan, Mich., Padgham Field	3S0	MBS	AU
Allegheny Radiobeacon, see Pittsburgh, Pa.			
Allegheny VORTAC, see Pittsburgh, Pa.			
Allen, Fla. DME Fix (NQX 245-22)	9FL		
Allen, Wisc. ATC Coordn Fix (MSP 183-86)	BFL		
Allen AAF, see Delta Junction			
0600-2200 LCL	BIG	BIG	AI
2200-0600 LCL	BIG	FAI	AI
Allen County VOR, See Lima Ohio			
Allen, Tx. Int. (BUJ 222-15/SCV 334)	8JL		
Allendale, Mich. Int. (MKE 096-181/ PSB 018-24)	3ZD		
Allendale, S.C. Allendale County Airport	88J	SAV	JX
Allendale, S.C., Allendale VOR	ALD		
Allenhurst Radiobeacon, See Hinesville, Ga.			
Allentown, Pa., Allentown-Bethlehem-Easton Airport.	ABE	AVP	NY
Allentown, Pa., Allentown Queen City Municipal Airport	1N9	AVP	NY
Allentown, Pa., Allentown VORTAC	ABE		
Allenville, Mo. Int. (FAM 138-35/ CGI 275)	9AM		
Alliance, Nebr., Alliance Airport	AIA	BFF	DV
Alliance, Nebr., Alliance VOR	AIA		
Alliance, Nebr., Antioch Radiobeacon	AOQ		
Alliance, Ohio, Alliance Airport	8GR	CLE	OB
Alliance, Ohio, Miller Airport	4G3	CLE	OB
Allison, Ia. Municipal Airport	K98	CID	AU
Allison, S.D. Int. (ABR 222-43/ HON 182)	3LI		
Alma, Ga., Alma-Bacon Airport			
0600-2200 Lcl	AMG	AMG	JX
2200-0600	AMG	SSI	JX
Alma, Ga., Alma FSS	AMG		
Alma, Ga., Alma VORTAC/WP	AMG		
Alma, Kans. Int. (TOP 254-48/ MHK 138/EMP 328)	3AX		
Alma, Mich., Gratiot Community Airport	AMN	MBS	OB
Alma, Mich., Alma Radiobeacon	AMN		
Alma City, Minn., Int. (RST 284/ MSP 182)	3ZC		
Almyra, Ar. Almyra Municipal Airport	M73	LIT	ME
Alpena, Mich., Phelps Collins Airport	APN	PLN	MP
Alpena, Mich., Collins Radiobeacon	CNS		
Alpena, Mi., Thunder Bay Island CGLS/WOS	48Y		
Alpena, Mich., Alpena VORTAC	APN		
Alpha, Mi. Int. (CRL 308-52/FNT 231)	9FH		
Alpine, Ark. Int. (HOT 218-PGO 111)	2AN		
Alpine Radiobeacon, see Gaylord, Mi.			
Alpine, N.Y., Alpine Radiobeacon	ALP		
Alpine, Tex., Alpine Municipal Airport	E38	ELP	AB
Altamont, Ca. Int. (OAK 068-23/ SAC 177-39/SCK 250-27)	4AT		
Altavista, Va. Altavista International Airport	1W1	ROA	DC
Alto, La. Int. (MLU 097-21/HEZ 329)	BAO		
Alton, Ill., Civic Memorial Airport	ALN	STL	KC
Alton, Ill., Civic Memorial Radiobeacon	CVM		
Altoona, Pa., Blair County Airport	AOO		OB
Altoona, Pa., Altoona FSS	AOO		
Altoona, Pa., Altoona VOR	AOO		
Altoona, Pa., Peterson Memorial Field	9G9	PSB	OB
Alturas, Calif., Municipal Airport	O88	LMT	SE
Altus, Ok., Altus AFB	LTS	HBR	FW
Altus, Okla., Altus AFB ILS Runwy 17	ALT		
Altus, Okla., Altus TACAN	LTS		
Altus Okla., Altus VOR	LTS		
Altus, Okla., Altus Municipal Airport	AXS	HBR	FW
Alva, Miss. Int. (CBM 266-55)	2VA		
Alva, Okla., Alva Radiobeacon	AVK		
Alva, Okla., Municipal Airport	3K1	GAG	KC
Alvin, Tx. Alvin Airpark	6R5	GLS	HU
Alvin Callender NAS, see New Orleans, La.	NRG	NEW	HU
Alyeska, Alaska, Alyeska Airport	AQY	ANC	AN
Amado, Ariz. DME Fix (DMA TACAN 198-18)	BAM		
Amana, Iowa, Hursh Airport	C11	CID	AU
Amarillo, Tex., Amarillo Air Terminal	AMA		AB
Amarillo, Tex., Amarillo FSS	AMA		
Amarillo, Tex., Amarillo Radiobeacon Runway 3	AMA		
Amarillo, Tex., Amarillo VORTAC	AMA		
Amarillo, Tex., Tradewind Airport	TDW	AMA	AB
Amazon Radiobeacon, see St. Joseph, Mo.	AZN		
Amber, Ok. Int. (OKC 193-13' TIK 248)	BAB		
Ambler, Alaska, Ambler River Airport	ABL	OTZ	AN
Ambler, Pa., Ambler Radiobeacon	ING		
Amboy, N.J., Int. (355COL/069ARD)	7AY		
Amchitka, Alaska, Amchitka Airport	AHT	COB	AN
Amchitka Island, Ak., Navy Automatic Weather Station	NIA		
Amelia, La., Amelia Airport	4R6		HU
Amelia, La. Lake Palourde Base Heliport	7R1	NEW	HU
Amelia, Va. Int. (RIC 245-26 FAK 177)	7AM		
Amelia, Va. Hilltop Airport	W88	RIC	DC
0600-2200 LCL Time	W88	BKT	
2200-0600 LCL Time	W88	RIC	DC
American Falls, Id., American Falls Airport	U81	BYI	LC
Americus, Ga. Int. (ABY 351-26 VNA 259)	2AU		
Americus, Ga. Souther Field	ACJ	ABY	TL
Americus, Ga., Souther Radiobeacon	ACJ		
Ames, Iowa, Municipal Airport	AMW	DSM	MP
Ames, Iowa, Ames Radiobeacon	AMW		
Amherstdale, W. Va. Amherstdale Landing Strip	H98	CRW	ID
Amiret, Mn. Int. (RWF 248-29.4/ MML 158)	3M1		
Amish, Pa. Int. (HAR 184' SAX 242)	7AH		
Amityville, N.Y., Zahns Airport	AYZ	ISP	NY
Amsterdam Radiobeacon, see Bozeman, Mont.			
Anacapa, Calif. Int. (OAF 249 SBA 133-24)	4AN		
Anacortes, Wash., Anacortes Airport	74S	BLI	SE
Anacortes, Wa., Patos Island CGLS/WOS	94S		
Anacostia, D.C., Navy Radiobeacon	NDV		
Anadarko, Okla., Municipal Airport	F68	OKC	FW
Anaheim, Calif., Anaheim Disneyland Heliport	AHA	LAX	LA
Anahuac, Tex., Chambers County Airport	T88	HOU	HU
Anaktuvuk Pass, Ak. Anaktuvuk Pass Airport	AKP		
0555-2145 LCL	AKP	BTT	AN
2145-0545 LCL	AKP	FAI	AN
Anamosa, Ia. Int. (CID 052-24' CVA 298)	9AJ		
Anasco, P.R. Int. (RSJ 202-16 DDP 261 trg/ PSE 308)	9KN		
Anchor, Hawaii Int. (KOA 297-15 MUE 240)	6AN		
Anchorage, Alaska, APTCC	ZAN		
Anchorage, Alaska, Anchorage FSS	ANC		
Anchorage, Alaska, Anchorage International Airport	ANC		AN
Anchorage Alaska, Anchorage VORTAC	ANC		
Anchorage Alaska, Campbell Air Strip	CSR	ANC	AN

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On the sample page, identifiers are translated into the corresponding city name.

SCAN

LVS Las Vegas, N. Mex., Las Vegas Airport
LVS Las Vegas, N. Mex., Las Vegas FSS
LVS Las Vegas, N. Mex., Las Vegas VORTAC
LVT Livingston, Tenn., Livingston VORTAC
LWB Lewisburg, W.Va., Greenbrier Valley Airport
LWB Lewisburg, W.Va., Lewisburg Radiobeacon
LWC Lawrence, Kans., Lawrence Radiobeacon
LWL Wells, Nev., Harriet Field
LWL Wells, Nev., Wells VOR
LWM Lawrence, Mass., Lawrence Airport
LWM Lawrence, Mass., Lawrance VOR
LWS Lewiston, Idaho, Lewiston-Nez Perce County Airport
LWS Lewiston, Idaho, Lewiston VOR
LWT Lewistown, Mont., Lewistown Airport
LWT Lewistown, Mont., Lewistown FSS
LWT Lewistown, Mont., Lewistown VORTAC
LWV Lawrenceville, Ill., Lawrenceville-Vincennes Municipal Airport
LWV Lawrenceville, Ill., Lawrenceville VOR
LXB Pittsburgh, Pa., Greater Pittsburgh Airport ILS Runway 28L
LXL Little Falls, Mn. Little Falls Municipal Airport
LXL Little Falls, Mn. Little Falls Radiobeacon
LXN Lexington, Nebr., Lexington Airport
LXN Lexington, Nebr., Lexington Radiobeacon
LXV Leadville, Colo., REP
LYH Lynchburg, Va., Preston Glenn Airport
LYH Lynchburg, Va., Lynchburg VORTAC
LYO Lyons, Kans., Lyons-Rice County Municipal Airport
LYO Lyons, Kans., Lyons Radiobeacon
LYS Olean, N.Y., Olean Radiobeacon

M

MAC Macon, Ga., Herbert Smart Downtown Airport
MAD Madison, Conn., VORTAC
MAE Madera, Calif., Madera Airport
MAF Midland, Tex., Midland FSS
MAF Midland, Tex., Midland Regional Air Terminal
MAF Midland, Tex., Midland VORTAC
MAH Findlay, Ohio, Marathon TVOP
MAI Marianna, Fla., Municipal Airport
MAI Marianna, Fla., Marianna VORTAC
MAL Malone, N.Y., Dufort Airport
MAO Marion, S.C. Marion Radiobeacon
MAP Naples, Fo., Naples VORTAC
MAW Malden, Mo., Malden Airport
MAW Malden, Mo., Malden VORTAC
MAZ Mayaguez, Puerto Rico, Mayaguez Airfield
MAZ Mayaguez P. R., Mayaguez Radiobeacon
MAZ Mayaguez, P.R. Mayaguez VOR
MBG Mobridge, S. Dak., Mobridge Airport
MBG Mobridge, S. Dak., Mobridge VOR
MBL Manistee, Mich., Manistee - Blacker Airport
MBL Manistee, Mich., Manistee VOR
MBS Saginaw, Mich., Saginaw FSS
MBS Saginaw, Mich, Saginaw VORTAC
MBS Saginaw, Mich., Tri City Airport
MBT Murfreesboro, Tn., Lascassas Radiobeacon
MBW Medicine Bow, Wyo., Medicine Bow VORTAC
MBY Moberly, Mo., Omar N. Bradley Airport
MCB McComb, Miss., McComb-Pike County Airport
MCB McComb, Miss., McComb FSS
MCB McComb, Miss., McComb VORTAC
MCC Sacramento, Ca. McClellan AFB Western A.F. Rescue Center
MCC Sacramento, Calif., McClellan Radiobeacon
MCC Sacramento, Calif., McClellan TACAN
MCE Merced, Calif., Merced VOR
MCE Merced, Calif., Merced Airport
MCF Tampa, Fla., MacDill AFB
MCF Tampa, Fla., MacDill AFB TACAN
MCG McGrath, Alaska, McGrath Airport
MCG McGrath, Ak. McGrath FSS
MCG McGrath, Alaska, McGrath VORTAC
MCI Kansas City, Mo., Kansas City International Airport
MCK McCook, Nebr., McCook Airport
MCK McCook, Nebr., McCook VOR
MCM Macon, Mo., Macon VORTAC
MCN Macon, Ga., Lewis B. Wilson Airport
MCN Macon, Ga., Macon FSS
MCN Macon, Ga., Macon VORTAC
MCO Orlando, Fla., McCoy AFB
MCO Orlando, Fla., McCoy TACAN
MCU Rochester, N. Y., ILS Runway 4
MCW Mason City, Iowa, Mason City Airport
MCW Mason City, Iowa, Mason City FSS
MCW Mason City, Iowa, Mason City VORTAC
MCX Monticello, In. White County Airport
MCX Monticello, Ind., White County Radiobeacon
MCY Mercury, Nev., Mercury Radiobeacon
MCZ Williamston, N.C. Williamston Radiobeacon
MDA San Antonio, Tex., Martindale AAF
MDC Boston, Mass. Logan Int'l Airport, Malden Radiobeacon BC Runway 33L
MDD Midland, Tex., Midland Airpark
MDE Cincinnati, Ohio, Madeira Radiobeacon
MDE Madeira, Ohio, Madeira Radiobeacon
MDL Valdosta, Ga., Moody AFB ILS Runway 36R
MDH Carbondale-Murphysboro, Ill., Southern Illinois Airport
MDH Carbondale, Ill., Carbondale Radiobeacon
MDN Madison, Ind., Jefferson Proving Ground
MDO Middleton Island, Alaska Intermediate Field
MDO Middleton Island, Alaska, Middleton Island VORTAC
MDR Medfra, Alaska, Medfra Airport
MDS Madison, S.D. Wentworth Radiobeacon
MDT Middletown, Pa., Harrisburg International Airport - Olmsted Field
MDV Baltimore, Md., Martin Marietta Airport Middle River VOR
MDW Chicago, Ill., Chicago-Midway Airport
MDZ Medford, Wi. Medford Radiobeacon
MEA Gassoway, W. Va., Meadows Radiobeacon
MED Chicago, Ill., O'Hare ILS Runway 09R
MEE Muskogee, Okla., Davis VOR
MEH Meacham, Creg., REP
MEI Meridian, Miss., Key Field
MEI Meridian, Miss., Meridian FSS
MEI Meridian, Miss., Meridian VORTAC/WP
MEM Memphis, Tenn., Brooks Radiobeacon
MEM Memphis, Tenn., Memphis International Airport
MEM Memphis, Tenn., Memphis FSS
MEM Memphis, Tn., Memphis VORTAC/WP
MEO Jefferson City, Mo., Memorial Radiobeacon
MEO Memorial Radiobeacon, see Jefferson City, Mo.
MER Merced, Calif. Castle AFB
MER Merced, Calif., Castle TACAN
MEV Minden, Nev., Douglas County Airport
MEY Mapleton, Ia. Mapleton Municipal Airport
MEY Mapleton, Ia., Mapleton Radiobeacon
MEZ Mena, Ar. Mena Radiobeacon
MFA Miami, Fla., Int'l Airport, ILS Runway 09L
MFD Mansfield, Ohio, Mansfield Lahm Municipal Airport
MFD Mansfield, Ohio, Mansfield CS/T

366

What are the identifiers for the following? Refer to frame 342.

..... Alyeska, Alaska

..... Almyra, Ark.

AQY
.....

M73
.....

367

Identify the following. Refer to frame 343.

..... MAE

..... MCI

..... MDD

Madera, Calif.

Kansas City, Mo.

Midland, Tex.

368

Which handbook would you use to look up the three-letter code for Dallas, Texas?

.....

Location Identifiers Handbook

369

The Contractions Handbook contains the approved word and phrase contractions used by FAA personnel. See example below.

7340.IE

CONTRACTIONS

October 1, 1975

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRAFFIC SERVICE

This handbook is also used by other organizations which provide air traffic control, communications, weather, charting, and associated services.

370

During your career with the FAA, you will be concerned with the contractions contained in this handbook. See the table of contents below.

SCAN

TABLE OF CONTENTS

The following is a page from the Contractions Handbook.

SCAN

Air Traffic Control Contractions

Encode

A

abeam ..... ABM
aboard ..... ABD
above clouds ..... ACLD
above ground level ..... AGL
above sea level ..... ASL
accelerate ..... ACLT
accept ..... ACPT
accident ..... ACDNT
accident notice ..... ACNOT
account ..... ACCT
account mechanical ..... AMECH
account traffic ..... ATFC
account weather ..... AWX
acknowledge ..... ACK
acknowledgement of receipt (message handling) ..... R
acrobatic ..... ACRBT
acting ..... ACTG
activate ..... ACTVT
activate IFR flight plan ..... AIFP
activate VFR flight plan ..... AVFP
active ..... ACTV
actual time of arrival ..... ATA
actual time of departure ..... ATD
actual time of penetration ..... ATP
actual time of release ..... ATRLS
additional traffic is ..... ADNL TFC
adjacent ..... ADJT
Automated Radar Terminal System ..... ARTS
advise ..... ADZ
advise arrival ..... ADZAR
advise Customs ..... ADCUS
advise if able ..... AIA
advise if able to proceed ..... AAP
advise intentions ..... ADZI
advise present position and altitude ..... APPA
after passing ..... APSG
ahead ..... AHD
Air or Army National Guard (military aircraft identification prefix) C
Airborne Early Warning ..... AEW
airborne launching ..... ABLCHG
air base ..... AB
airborne ..... AB
airborne pulse search radar ..... APS
air carrier ..... ACR
air combat maneuvers ..... ACM
air combat training ..... ACT
air conditioning ..... A/C
aircraft ..... ACFT
Air Carrier District Office ..... ACDO
aircraft departing at (number of minutes) intervals ..... ADMIS
Aerospace Defense Command ..... ADC
aircraft out of commission for parts ..... AOCP
Air Defense Control Facility ..... ADCF
Air Defense Direction Center ..... ADDC
Air Defense Identification Zone ..... ADIZ
Air Defense Liaison Officer (at NORAD Headquarters) ..... ADLO
Air Defense Warning ..... ADW
airfile ..... A/F
air evacuation ..... AEVAC
air evacuation aircraft (military aircraft identification prefix) ..... E
Air Force ..... AF
Air Force Base ..... AFB
Air Force Jet ..... AFJ
air height surveillance radar AHSR-1
air ground ..... AG
Airport Advisory Service ..... AAS
airport of entry ..... AOE
Airport Reservation Office ..... ARO
airport surface detection equipment ..... ASDE
airport surveillance radar ..... ASR
airport traffic control tower ..... ATCT
Airman's Information Manual ..... AIM
Airmen's Meteorological Information ..... AIRMET
Airmen Advisory (a Notice to Airmen for local dissemination only) ..... AIRAD
air refueling ..... AIRFL
air refueling control point ..... ARCP
air refueling egress point ..... AREP
air refueling initial point ..... ARIP
Air Rescue Service (USAF) ..... ARS
air route surveillance radar ..... ARSR
air route traffic control ..... ARTC
Air Route Traffic Control Center ..... ARTCC
air route traffic control center clearance delivered (towers only) (ctl only) ..... B
airspace ..... ASP
Air Traffic Division ..... ATD
ATC advises ..... CA
air traffic control beacon interrogator ..... ATCBI
ATC clears (ctl only) C
ATC requests ..... CR
airway ..... AWY
alert notice ..... ALNOT
alfa (phonetic) ..... A
All Accident Notice Offices ..... ALANO
all International Telecommunications Switching Centers ..... ALIATSC
all courses and quandrants ..... ACQ
all weather landing ..... AWL
all weather low altitude route ..... AWLAR
all concerned notified ..... ACN
allowable take-off gross ..... ATOG
all right ..... OK
alternate (approach and landing charts only) ..... A

Scan this page.

Page A–2

ADMAP.....advise by air mail as soon as practicable
ADMIN.....administration
ADMIR.....Administrator
ADMIS.....aircraft departing at (number of minutes) intervals
ADMIV.....administrative
ADML.....Admiral
ADML TPC.....additional traffic is (ctl. only)
ADNOK.....advise if not correct
ADNOT.....ADIS Notice
ADO.....Airport District Office
ADP.....Automatic Data Processing
ADPE.....Automatic Data Processing Equipment
ADPP.....Automatic Data Processing Programs
ADPS.....Automatic Data Processing Systems
ADQT.....adequate
ADR.....advisory route (ICAO abbr.)
ADRDE.....advise reason for delay
ADRNDCK.....Adirondack
ADS.....address
ADSPN.....advise disposition
ADTAC.....Automatic Digital Tracking Analyzer Computer
ADVALT.....advice of allotment or allotment advice
ADVC.....advice
ADVCTN.....advection
ADVN.....advance
ADW.....Air Defense Warning
ADZ.....advise
ADZAR.....advise arrival
ADZI.....advise intentions
ADZOF.....advise this office
ADZY.....advisory
AED..Associate Administrator for Engineering and Development (FAA)
AEG.....Aviation Evaluation Group
AEM.....aircraft and engine mechanic
AEM.....aircraft and engine mechanic
AENG.....Airways Engineer
AEQ.....Office of Environmental Quality (FAA)
AER.....approach end runway
AERO.....aviation routine weather report (in international MET figure code (ICAO abbr.)
AERO.....aeronautical; aeronautics
AEVAC.....air evacuation
AEW.....airborne early warning
AF.....Air Force
AF.....aviation facilities
A/F.....airfile
AFB.....Air Force Base
AFC.....automatic frequency control (Airway Facilities)
AFCOM.....AFTN Communications Center, FAA (Kansas City, Mo.)
AFCS.....Air Force Communications Service
AFCT.....affect
AFDK.....after dark
AFIL.....filed flight plan in the air (ICAO abbr.)
AFIO.....Authorization for Fighter interceptor Operations
AFIRM.....affirmative
AFJ.....Air Force jet
AFNEA.....Air Force NOTAM Exchange Area
AFNEO.....Air Force NOTAM Exchange Office
AFP.....alternate flight plan
AFRT.....air freight
AFS.....Flight Standards Service (FAA)
AFS.....airways facilities sector
AFS.....aeronautical fixed service (ICAO abbr.)
AFT.....after
AFTN.....afternoon
AFTN.....Aeronautical Fixed Telecommunications Network
AG; A/G.....air-ground
AGA.....Office of General Aviation (FAA)
AGA.....aerodromes, air routes and ground aids (ICAO abbr.)
AGACS.....automatic ground air/ground communication system
AGC.....Office of Chief Counsel (FAA)
AGC.....automatic gain control (Airway Facilities)
AGCA.....automatic ground controlled approach
A-GEAR.....arresting gear
AGL.....above ground level
AGN.....again
AGR.....agree
AGRMT.....agreement
AGT.....agent
AHD.....ahead
AHSR–1.....air height surveillance radar
AI.....arrival approval request for IFR flight
AIA.....Office of International Aviation Affairs (FAA)
AIA.....advise if able
AID.....Airport Information Desk
AIFP.....activate IFR flight plan
AILS.....Automatic Instrument Landing System
AIM.....Airmen's Information Manual
AIP.....Aeronautical Information Publication (ICAO abbr.)
AIRAD.....Airmen's Advisory (a Notice to Airmen for local dissemination only)
AIRCOMNET.....Air Force Communications Network
AIREP.....plain language form of air-report (ICAO abbr.)
AIRFL.....air refueling
AIRMET.....Airman's Meteorological Information
AIROPNET.....Air Operations Network
AIS.....Office of Information Service (FAA)
AIS.....Aeronautical Information Service(s)
AK.....Alaska
AL.....all (when used as prefix)
AL.....annual leave
AL/.....at least *(altitude)*
AL.....Alaskan Region, FAA
AL.....Alabama
ALACFO.....All Air Carrier Field Offices
ALADLO.....all Air Defense Liaison Officers in region
ALAFFO.....All Airway Facilities Sector and Field Offices
ALANO.....All Accident Notice Offices
ALARTC.....all air route traffic control centers in region
ALAT.....all Air Traffic Service personnel in region
ALATF.....All Air Traffic Field Facilities
ALATFO.....All Air Traffic Field Offices
ALCT.....attempt to locate
ALCKT.....all stations or offices having send-receive teletypewriter service on circuit
ALCS/C.....all AT combined station/centers in region
ALCS/T.....all AT combined station/towers in region
ALDA.....Air Line Dispatchers Association
ALERFA.....message relates to alert phase (ICAO abbr.)
ALF.....aloft
ALFAA.....all FAA Field Offices & personnel
ALFAB.....All FAA Offices on Service B
ALFOF.....all FAA field offices
ALFSFO.....All Flight Standards Field Offices
ALFSS.....all flight service stations in region
ALG.....Logistics Service (FAA)
ALG.....along
ALGHNY.....Allegheny
ALGTG.....alighting
ALIATSC.....All International Aeronautical Tellecommunications Switching Centers
ALIFSS.....all international flight service stations in region
ALNMT.....alignment
ALNOT.....alert notice
ALP.....airport layout plan
ALP.....airport location point
ALPA.....Air Line Pilots Association
ALQDS.....all quadrants
ALR.....Office of Labor Relations (FAA)
ALRAFAC.....all radar air traffic control facilities in region
ALRGN.....all Regional Offices
ALS.....approach lighting system
ALSEC.....all sectors
ALSF–1.....standard 3000 foot high intensity ALS with sequenced flashers category I configuration
ALSF–2.....standard 3000 foot high intensity ALS with sequenced flashers category II configuration

373

Encode the following words: (1) above sea level, (2) air evacuation, and (3) aircraft. Refer to frame 349.

.....

.....

.....

ASL

AEVAC

ACFT

374

Decode the following: (1) AGL, (2) A/F, and (3) AIRFL. Refer to frame 350.

.....

.....

.....

Above ground level

Airfile

Air refueling

The Airman's Information Manual (AIM) is an FAA publication which contains information about the status of components of the Nationa Airspace System and serves as a preflight and inflight reference for pilots. It has been designed as a pilot's operational manual for use primarily within the United States. See example below.

The AIM is divided into four basic parts: (1) Basic Flight and ATC Procedures, (2) Airport Directory, (3) Operational Data and Notices to Airmen, and (4) Graphic Notices and Supplemental Data.

376

Part 1 contains basic fundamentals required for flying in the National Airspace System and facts of interest to pilots, and ATC information affecting rules, regulations, and procedures. Below is a page from Part 1. Scan this page.

TABLE OF CONTENTS

The following is a page from Part 1. Scan this page.

Chapter 1. NAVIGATION AIDS

AIR NAVIGATION RADIO AIDS

GENERAL

Various types of air navigation aids are in use today, each serving a special purpose in our system of air navigation.

These aids have varied owners and operators namely: the Federal Aviation Administration, the military services, private organizations; and individual states and foreign governments.

The Federal Aviation Administration has the statutory authority to establish, operate, and maintain air navigation facilities and to prescribe standards for the operation of any of these aids which are used by both civil and military aircraft for instrument flight in federally controlled airspace. These aids are tabulated in the Airport/Facility Directory by State in Part 3 of this Manual.

A brief description of these aids follows. Also, a composite table of normal usable altitudes and distances appears in Class of VOR/VORTAC/TACAN.

NON-DIRECTIONAL RADIO BEACON (NDB)

1. A low or medium-frequency radio beacon transmits nondirectional signals whereby the pilot of an aircraft equipped with a loop antenna can determine his bearing and "home" on the station. These facilities normally operate in the frequency band of 200 to 415 kHz and transmit a continuous carrier with 1,020-cycle modulation keyed to provide identification except during voice transmission.

2. When a radio beacon is used in conjunction with the Instrument Landing System markers, it is called a Compass Locator.

3. All radio beacons except the compass locators transmit a continuous three-letter identification in code except during voice transmissions. Compass locators transmit a continuous two-letter identification in code. The first and second letters of the three-letter location identifier are assigned to the front course outer marker compass locator (LOM), and the second and third letters are assigned to the front course middle marker compass locator (LMM).

Example:

ATLANTA, ATL, LOM-AT, LMM-TL.

4. Voice transmissions are made on radio beacons unless the letter "W" (without voice) is included in the class designator (HW).

5. Radio beacons are subject to disturbances that result in ADF needle deviations, signal fades and interference from distant station during night operations. Pilots are cautioned to be on the alert for these vagaries.

VHF OMNIDIRECTIONAL RANGE (VOR)

1. VOR's operate within the 108.0-117.95 MHz frequency band and have a power output necessary to provide coverage within their assigned operational service volume. The equipment is VHF, thus, it is subject to line-of-sight restriction, and its range varies proportionally to the altitude of the receiving equipment. There is some "spill over," however, and reception at an altitude of 1000 feet is about 40 to 45 miles. This distance increases with altitude.

2. There is voice transmission on the VOR frequency available over the VOR's.

3. The effectiveness of the VOR depends upon proper use and adjustment of both ground and airborne equipment.

a. **Accuracy:** The accuracy of course alignment of the VOR is excellent, being generally plus or minus 1°.

b. **Roughness:** On some VORs, minor course roughness may be observed, evidenced by course needle or brief flag alarm activity (some receivers are more subject to these irregularities than others). At a few stations, usually in mountainous terrain, the pilot may occasionally observe a brief course needle oscillation, similar to the indication of "approaching station." Pilots flying over unfamiliar routes are cautioned to be on the alert for these vagaries, and in particular, to use the "to-from" indicator to determine positive station passage.

(1) Certain propeller RPM settings can cause the VOR Course Deviation Indicator to fluctuate as much as ±6°. Slight changes to the RPM setting will normally smooth out this roughness. Helicopter rotor speeds may also cause VOR course disturbances. Pilots are urged to check for this propeller modulation phenomenon prior to reporting a VOR station or aircraft equipment for unsatisfactory operation.

4. The only positive method of identifying a VOR is by its Morse Code identification or by the recorded automatic voice identification which is always indicated by use of the word "VOR" following the range's name. Reliance on determining the identification of an omnirange should never be placed on listening to voice transmissions by the Flight Service Station (FSS) (or approach control facility) involved. Many FSS remotely operate several omniranges which have different names from each other and in some cases none have the name of the "parent" FSS. (During periods of maintenance the coded identification is removed. See MAINTENANCE OF FAA NAVAIDS.)

● 5. Voice identification has been added to numerous VHF omniranges. The transmission consists of a voice announcement, "AIRVILLE VOR" alternating with the usual Morse Code identification.

378

Is the Airman's Information Manual designed for use by the pilot or the air traffic controller?

.....

The pilot

379

Which of the four parts of the AIM contains information about air traffic procedures? Refer to frame 353.

.....

Part I

380

The En Route Air Traffic Control Handbook prescribes air traffic control procedures and phraseology for use by personnel providing en route air traffic control services. See example below.

7110.9D

EN ROUTE AIR TRAFFIC CONTROL

JANUARY 1 1975

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Service

Controllers are required to be familiar with the provisions of this handbook which pertain to their operational responsibility and to exercise their best judgment if they encounter situations not covered by it. Revisions for this handbook are published and distributed to you every three months. You will be responsible for updating you personal copy.

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The following table of contents was taken from the En Route Air Traffic Control Handbook.

TABLE OF CONTENTS

Chapter 1. INTRODUCTION

Chapter 2. GENERAL CONTROL

Scan this page.

TABLE OF CONTENTS—*Continued*

Scan this page from the En Route Handbook.

Section 6. ROUTE AND NAVAID DESCRIPTION

160. AIRWAYS AND ROUTES

Describe airways or jet routes as follows:

a. VOR/VORTAC/TACAN airways or jet routes—state the word "victor" or the letter "J", followed by the number of the airway or route in group form. For RNAV routes add the word "ROMEO". (E)

160.a. Examples.—
"Victor twelve."
"J five thirty three."
"Victor seven ten ROMEO."
"J eight thirty ROMEO."
"Offset one zero miles right of J eight thirty ROMEO."

b. VOR/VORTAC/TACAN alternative airways—state the word "victor," followed by the number of the airway in group form and the alternative direction. (E)

160.b. Example.—
"Victor twelve south."

c. L/MF airways—state the color of the airway, followed by the number in group form. (E)

160.c. Example.—
"Blue eighty one."

161. NAVAID TERMS

Describe radials, arcs, courses, and bearings of navaids as follows:

a. VOR/VORTAC/TACAN navaids—state the name of the navaid, followed by the separate digits of the bearing of the radial (omitting the word "degrees"), and the word "radial." (E)

161.a. Example.—
"Appleton zero five zero radial."

b. Arcs about VOR-DME/VORTAC/TACAN navaids—state the distance in miles from the navaid, followed by the words "mile arc," the direction from the navaid in terms of the 8 principal points of the compass, the word "of," and the name of the navaid. (E)

161.b. Example.—
"One five mile arc southwest of Grantsville."

c. L/MF navaids—state the name of the station, followed by the bearing of the course from the station in terms of the 8 principal points of the compass, and the word "course." (E)

161.c. Example.—
"Roswell northeast course."

d. Nondirectional beacons—state the course to, or bearing from, the radio beacon, omitting the word "degree," followed by the words "course to" or "bearing from," the name of the radio beacon and the words "radio beacon." (E)

161.d. Example.—
"Three four zero bearing from Randolph Ra
Beacon."

162. NAVAID FIXES

Describe fixes determined by reference to a radial/localizer and distance from a VOR-DME/VORTAC/TACAN/ILS-DME as follows:

a. When a fix is not named, state the name of the navaid followed by the specified radial/localizer and state the distance in miles followed by the phrase "mile fix". (E)

162.a. Examples.—
"Appleton zero five zero radial three seven mile f
"Reno localizer back course 4 mile fix."

384

What type of information will you find listed under Chapter 2? Refer to frame 359.

.....

General Control

385

What information is contained in sections 6 and 7? Refer to frame 360.

.....

.....

Route and Navaid Description

Altimeter Settings

386

Write the phraseology for Appleton 50 degree radial. Refer to frame 361.

.....

Appleton zero five zero radial

387

The Terminal Air Traffic Control Handbook prescribes air traffic control procedures and phraseology for use by personnel providing terminal air traffic control services. See example below.

7110.8B

TERMINAL AIR TRAFFIC CONTROL

JANUARY 1 1975

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Service

Controllers are required to be familiar with the provisions of this handbook which pertain to their operational responsibility and to exercise their best judgment if they encounter situations not covered by it. Revisions for this handbook are published and distributed to you every three months. You will be responsible for updating your personal copy.

Scan this Table of Contents from the Terminal Handbook.

TABLE OF CONTENTS

Chapter 1. INTRODUCTION

Chapter 2. GENERAL CONTROL

TABLE OF CONTENTS—*Continued*

Read this page from the Terminal Handbook.

880. RESTRICTED AIRSPACE

If you are controlling an aircraft (including one maintaining VFR conditions-on-top in accordance with an IFR clearance, in an area adjacent to restricted airspace, take the following action before it enters the restricted airspace:

a. For joint-use restricted airspace:

(1) Coordinate, as necessary, with the facility designated as controlling facility or the using agency and obtain permission for the aircraft to operate in the airspace. (N)

(2) Clear the aircraft so it avoids the airspace if permission cannot be obtained.

b. For prohibited and nonjoint-use restricted airspace:

Clear the aircraft so it avoids the restricted airspace, unless one of the following conditions exits: (N)

(1) The aircraft informs you it has obtained permission from the using agency to operate in the airspace.

(2) The using agency informs you they have given permission for the aircraft to operate in the airspace. (N)

(3) The aircraft is on an approved ALTRV. (N)

881. RESTRICTED AIRSPACE AVOIDANCE

Take the following action to clear an aircraft so it avoids restricted airspace:

a. For an aircraft maintaining a specified altitude—clear it at an altitude or via a route which will avoid the airspace.

b. For an aircraft maintaining VFR conditions on top—clear it to conduct flight in VFR conditions on top above the upper limit or below the lower limit of the airspace.

Phraseology:

MAINTAIN V-F-R CONDITIONS ON TOP ABOVE [upper limit of restricted airspace] OR BELOW [lower limit of restricted airspace] ACROSS [name or number of restricted airspace] BETWEEN [fix] AND [fix].

c. For an aircraft on a radius-of-action flight—clear it via courses, quadrants, or radials within a radius of a navaid, excluding the airspace.

Phraseology:

CLEARED TO FLY [specified] COURSES/RADIALS/QUADRANTS OF [navaid name and type] WITHIN [number of miles] MILE RADIUS EXCLUDING:

[Name or number of restricted airspace].

or

ALL RESTRICTED AIRSPACE.

880.a.(1). Note.—The FAA is the controlling agency for joint-use restricted airspace, therefore, flight therein is authorized if permission is obtained from the using agency.

880.b. Note.—The FAA has no jurisdictional authority over the use of prohibited or nonjoint-use restricted airspace, therefore, clearance cannot be issued for flight therein.

880.b.(2). Note.—Using agency approval for flight in prohibited or nonjoint-use restricted airspace may be relayed to the pilot.

880.b.(3). Note.—Mission project officers are responsible for obtaining approval for ALTRV operations within restricted airspace.

391

What chapter and section covers navaid use limitations? Refer to frame 366.

.....

.....

Chapter 2

Section 3

392

What information is contained in sections 4 and 9? Refer to frame 367.

.....

.....

Altitude Assignment

Holding Aircraft

393

Which of the following can be found in the Terminal Handbook? Refer to frame 368.

..... A. Restricted Airspace

..... B. Contractions

A.

394

The Flight Services Handbook contains instructions for personnel performing flight service duties. It consists of two parts. Part I prescribes procedures and phraseology for use by personnel providing flight assistance and communications services. Part II, the teletypewriter portion, includes Services A and B teletypewriter operating procedures, pertinent International Teletypewriter Procedures, and the Weather Schedules. See example below.

FRONT COVER

7110.10C

FLIGHT SERVICES

JANUARY 1 1975

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Service

Flight Service Specialists are required to be familiar with the provisions of this handbook which pertain to their operational responsibilities and to exercise their best judgement if they encounter situations not covered by it.

395

Revisions for the Flight Services Handbook are published and distributed to you every three months. You are responsible for updating your personal copy.

SCAN

TABLE OF CONTENTS—PART I

Chapter 1. INTRODUCTION

Section 1. RESPONSIBILITY

Section 2. TERMS OF REFERENCE

Chapter 2. MONITORING

Section 1. NAVIGATION AIDS

Section 2. INTERPHONE, RADIO, AND TWEB

Chapter 3. RADIO AND INTERPHONE COMMUNICATIONS

Section 1. RADIO COMMUNICATIONS

Section 2. INTERPHONE COMMUNICATIONS

Read this page from the Flight Services Handbook.

READ

Chapter 2. MONITORING

Section 1. NAVIGATION AIDS

20. DUTIES

When the Air Traffic Division has assigned your facility the responsibility for monitoring NAVAIDS, take the following actions, as appropriate:

a. VOR/VORTAC

(1) Aurally check the identification at the beginning of each watch.

(2) Record the check on FAA Form 7230-4.

(3) If a monitor category 2 exists, notify the center.

NOTE 1.—VOR's VORTAC's and TACAN's have an automatic course alignment and signal monitor (ACM). This monitor is usually connected to a remote alarm. An automatic transfer and shutdown unit (ATU) is installed as part of the ACM. When the ACM detects a malfunction, the ATU switches the range to a standby transmitter. If the standby transmitter does not work properly, the ATU will shut down the facility.

NOTE 2.—Monitoring of VOR test signals (VOT) is accomplished by a light or buzzer monitor and is of local concern only.

NOTE 3.—VOR and VORTAC monitor categories:

(a) Category 1—Alarm feature and identification heard at control point.

(b) Category 2—Monitor equipment failure and identification not heard at control point but aircraft reports indicate facility operating normally.

(c) Category 3—Not constantly monitored by other than ACM and ATU.

b. TACAN (joint use airports):

(1) Aurally check the identification at the beginning of each watch.

(2) Immediately notify the responsible military authority when an alarm is received.

(3) Consider the aid inoperative when the alarm cannot be silenced and the identification cannot be heard on the usual monitor.

NOTE.—The military authority will issue Notices to Airmen for TACAN's; except, in the Pacific Region, the FAA will issue the Notices to Airmen on TACAN's.

NOTE.—*Alaska.* Tie-in facilities shall transmit Notices to Airmen originated by military officials on military aids.

c. DME (monitored by the same facility that monitors the associated VOR, VORTAC, or ILS):

(1) Press the VORW/DME control oscillator level to "facility on" position at the beginning of each watch.

(2) Record the check on FAA Form 7230-4.

d. L/MF aids (to be monitored on a continuous basis):

(1) Check the identification at the beginning of each watch.

(2) Record the check on FAA Form 7230-4.

e. NDB (class HH, H, and MH):

(1) Monitor continuously by automatic means beacons used as IFR aids.

(2) Check operation at least once each hour if an automatic alarm is not available.

f. ILS:

(1) Check the ILS monitor panel at the beginning of each watch and record the system status on Form 7230-4.

(2) When there are indications that a component (localizer, glide path, outer marker, middle marker) has failed, shut off that component and allow the rest of the system to continue operating.

NOTE.—Not all ILS components will be provided with remote monitor and control lines (on/off capability). If the failure indication is caused by a control line or control station monitor failure the Airways Facility technician shall advise if that component will be restored to operation and the monitor status. Reference SM P 6750.1 and SM P 6750.2.

397

What information is contained in Chapter 2? Section 1? Refer to frame 373.

.....

.....

Monitoring

Navigational Aids

398

At the beginning of each watch, what does an FSS specialist do concerning VOR/VORTAC? Refer to frame 374.

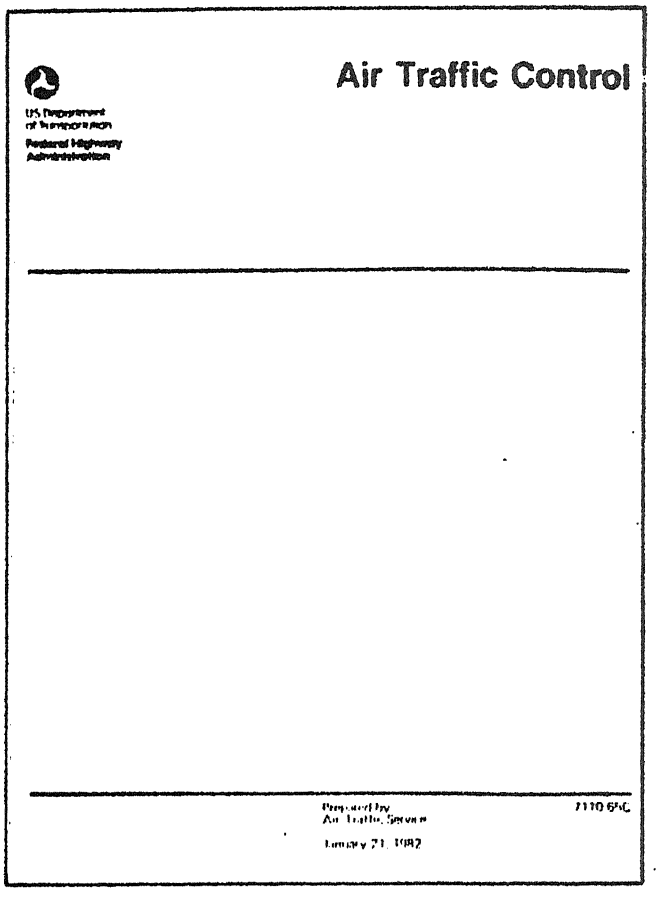
.....

Check the identification

399

The Air Traffic Control Handbook prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control service.

FRONT COVER



Controllers are required to be familiar with the provisions of this handbook which pertain to their operational responsibility and to exercise their best judgment if they encounter situations not covered by it. Revisions for this handbook are published and distributed to you every three months. You will be responsible for updating your personal copy.

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Chapter 1. INTRODUCTION

Chapter 2. GENERAL CONTROL

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Scan this page from the Air Traffic Control Handbook.

Section 7. ROUTE AND NAVAID DESCRIPTION

100. AIRWAYS AND ROUTES

Describe airways, route or jet routes as follows:

a. VOR/VORTAC/TACAN airways or jet routes—State the word "Victor" or the letter "J", followed by the number of the airway or route in group form. For RNAV routes add the word "Romeo."

100.a. Examples.—

"Victor Twelve."
"J Five Thirty-three."
"Victor Seven Ten Romeo."
"J Eight Thirty Romeo."
"Offset one zero miles right of J Eight Thirty Romeo."

b. VOR/VORTAC/TACAN alternative airways—State the word "Victor," followed by the number of the airway in group form and the alternative direction.

100.b. Example.—

"Victor Twelve South."

c. L/MF airways—State the color of the airway, followed by the number in group form.

100.c. Example.—

"Blue Eighty-one."

d. North American Route—State the words "North American Route" followed by the number of the route in group form.

100.d. Example.—

"North American Route Fifty."

e. MTRs—State the letters followed by the number of the route in group form.

100.e. Example.—

"IR Five Thirty-one."

101. NAVAID TERMS

Describe radials, arcs, courses, bearings and quadrants of NAVAIDs as follows:

a. VOR/VORTAC/TACAN NAVAIDs—State the name of the NAVAID, followed by the separate digits of the radial (omitting the word "degrees"), and the word "radial."

101.a. Example.—

"Appleton zero five zero radial."

b. Arcs about VOR-DME/VORTAC/TACAN NAVAIDs—State the distance in miles from the NAVAID, followed by the words "mile arc," the direction from the NAVAID in terms of the 8 principal points of the compass, the word "of," and the name of the NAVAID.

101.b. Example.—

"One five mile arc southwest of Grantsville."

c. Quadrant within a radius of NAVAID—State direction from NAVAID in terms of the quadrant, e.g., NE, SE, SW, NW, followed by the distance in miles from the NAVAID.

101.c. Example.—

"Cleared to fly northeast quadrant of Philipsburg VORTAC within four zero mile radius."

101.c. Reference—Route Use, 290.h. Glossary (Quadrant).

d. Nondirectional beacons—State the course to, or bearing from, the radio beacon, omitting the word "degree," followed by the words "course to" or "bearing from," the name of the radio beacon, and the words "radio beacon."

101.d. Example.—

"Three four zero bearing from Randolph Radio Beacon."

102. NAVAID FIXES

Describe fixes determined by reference to a radial/localizer and distance from a VOR-DME/VORTAC/TACAN/ILS-DME as follows:

a. When a fix is not named, state the name of the NAVAID, followed by a specified radial/localizer, and state the distance in miles followed by the phrase "mile fix".

102.a. Examples.—

"Appleton zero five zero radial three seven mile fix."
"Reno localizer back course 4 mile fix."

b. When a fix is named, state the name of the fix, followed by the phrase "D-M-E fix" or "Waypoint" as appropriate.

102.b. Examples.—

"Shaum D-M-E fix."
"Shaum Waypoint."

403

What type of information will you find listed under Chapter 2? Refer to frame 391.

.....

General Control

404

What information is contained in sections 6 and 7? Refer to frame 392.

.....

.....

Route and Navid Description

IFR Clearances

405

Write the phraseology for Appleton 50 degree radial. Refer to frame 393.

.....

Appleton zero five zero radial

Section 12

COMPUTERIZED AIR TRAFFIC CONTROL

AUTOMATED RADAR TERMINAL SYSTEMS (ARTS)

406

You have learned that the control of air traffic is complicated, requiring extensive technical knowledge on the part of the specialist, and support from other organizations such as Airways Facilities, Weather Bureau, etc. A major source of support to the specialist is the FAA Research and Development Section. Improvements in radar and other electronic devices continue to aid the specialist in his job. One product of research and development is the computerization of Air Traffic Control. Let's take a look at what a few Air Traffic Facilities are now using and what will become the everyday method of control in the future.

407

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408

The demand for air traffic control services in the United States has been growing at the rate of nearly 20% a year. This rapid growth has necessitated the development of an air traffic control automation program for en route and terminal facilities. When this system is completed it will provide for automated control of aircraft at those centers and terminals where traffic is most complex.

409

The overall control system operates in a three-dimensional environment and depends upon the specialists' knowing the identity, position, and altitude of each aircraft. Identification and position of aircraft are two of the three items needed for control purposes. What is the third?

.....

Altitude

410

Currently, the position of the aircraft is the only information shown on the radar scope. Radio communication is needed between the pilot and controller to obtain identification and altitude information.

What information is now shown on the radar scope?

.....

---

n of the aircraft.

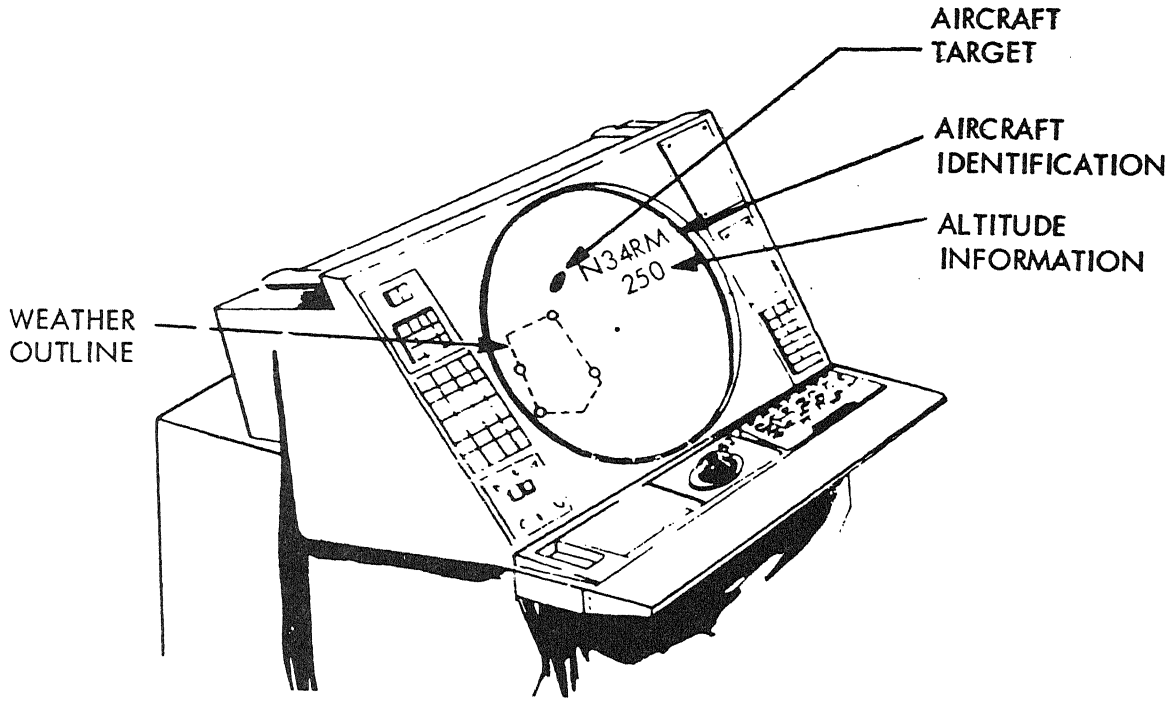
411
How does a controller obtain the identification and altitude of an aircraft?

.....

Radio communication.

412
In the new automated system all three items of information will automatically be shown on the scope by the use of alphanumerics (letters and numbers). In addition, weather information can be shown.

413



In the above illustration the controller observes the aircraft target on the scope. Adjacent to the target is the aircraft identification and altitude. As you can see, this will substantially reduce radio communications between pilots and controllers.

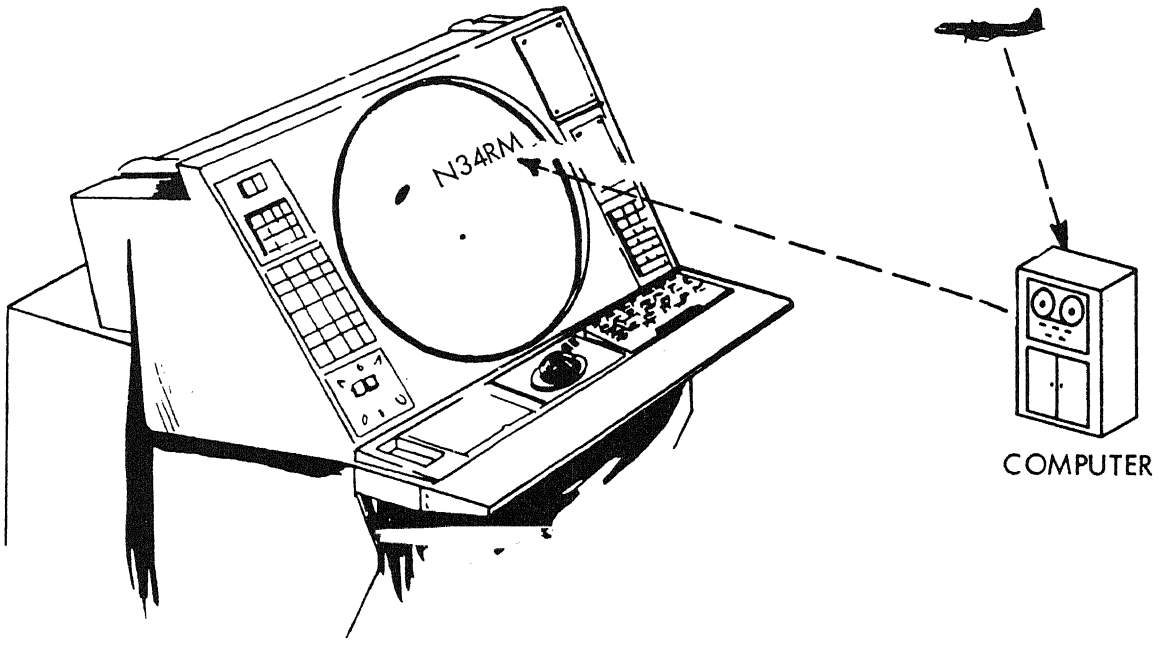
What does the word alphanumerics mean?

.....

Letters and numbers

414

The new system will display the **identification of aircraft** directly on the radar scope.

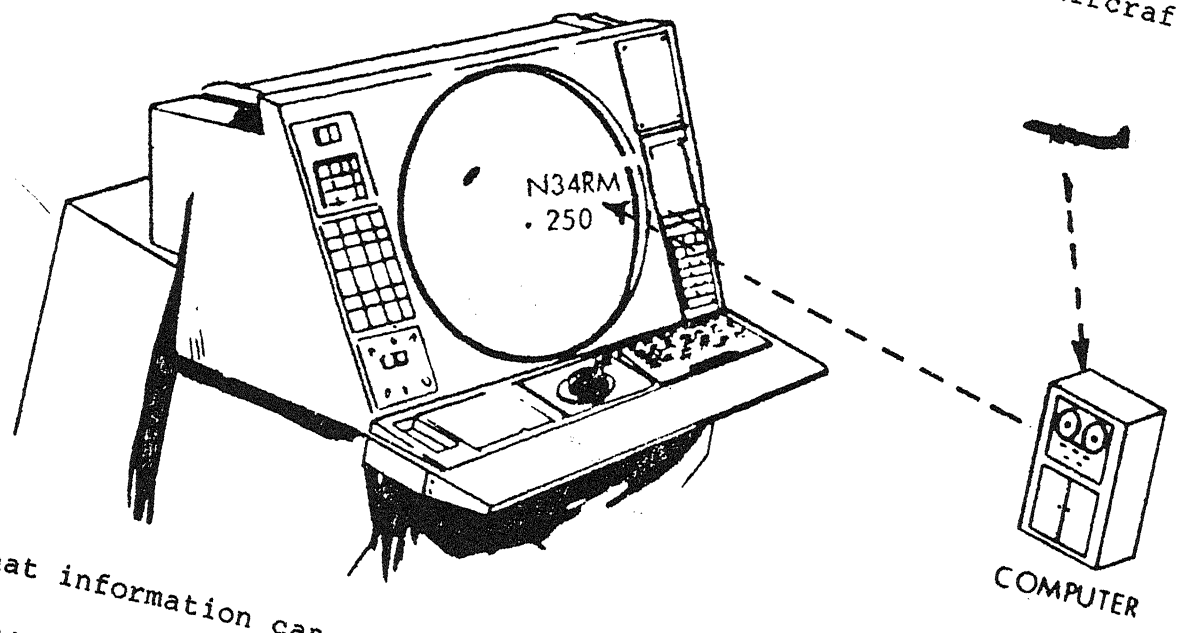


What is the aircraft identification in the above illustration?

.....

N34RM

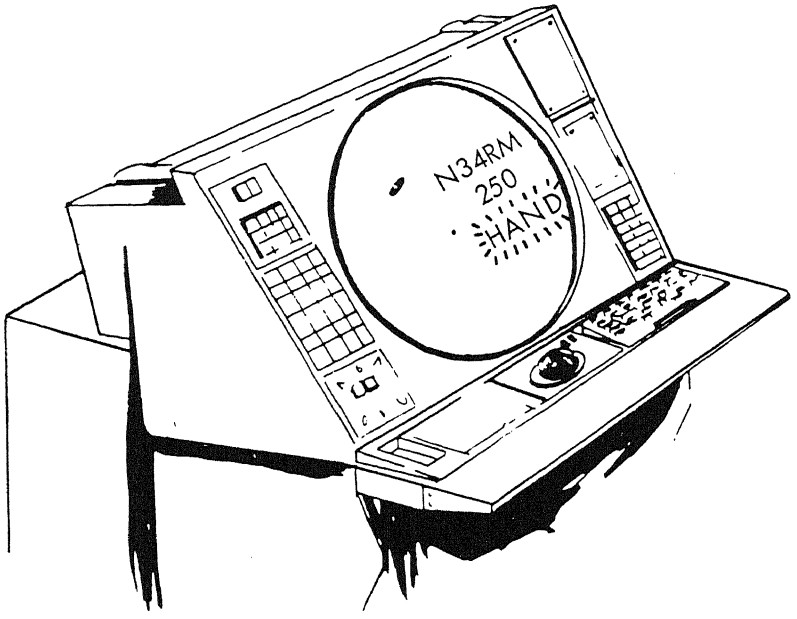
In addition to identification, the altitude of the aircraft will be displayed automatically.



What information can alphanumerics present to the controller?

Aircraft identification and altitude.

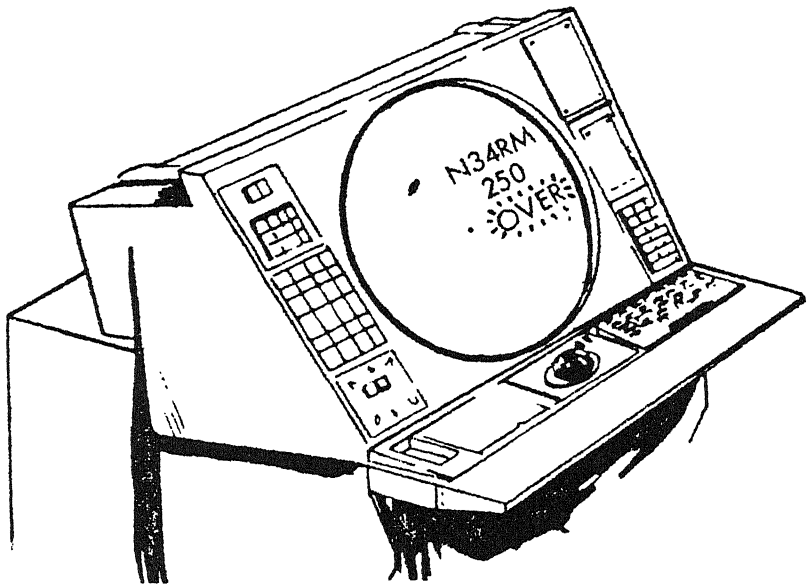
This system also provides for automatic handoff of an aircraft from one radar controller to another.



As the aircraft approaches a preselected handoff point the computer will automatically force the symbol, HAND, to appear on the transferring and receiving scopes. This symbol, HAND, will then blink on and off until appropriate action is taken by the receiving controller.

417

The receiving controller, when ready to accept this aircraft, will put an acceptance message into the computer and the symbol HAND will change to a blinking OVER.



When the transferring controller sees the blinking word, OVER, he will transfer radio communication with the aircraft to the receiving controller.

What symbol on the radar scope indicates to the transferring controller that the receiving controller is ready to accept the aircraft on a handoff?

.....

The word "OVER" blinking on the scope.

418

Current handoff procedures require the transferring controller to call the receiving controller by interphone and state the aircraft's position. The receiving controller after observing the target on his scope then advises that he will accept the aircraft. Obviously the automatic handoff system using alphanumerics will reduce manual coordination considerably.

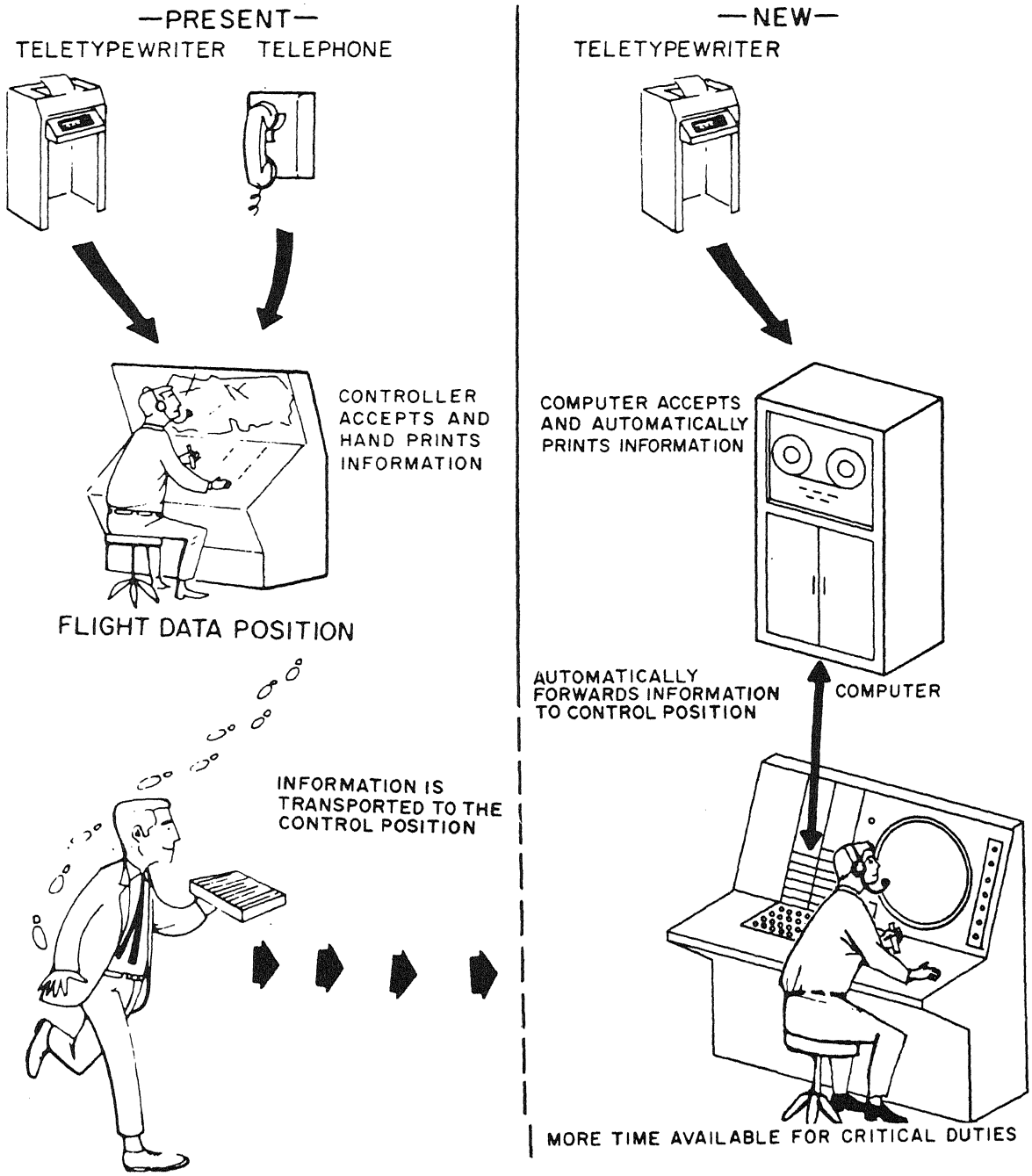
419

In addition to alphanumeric readouts, the new automated system also has the capability of adding other features such as conflict prediction, collision avoidance, and aircraft sequencing.

420

Computers will also be used to reduce the time spent in hand copying and transporting flight movement and other printed control information.

COMPARE THE SYSTEMS



421

Name the advantage of the new system over the old.

.....

More time available for critical duties.

422

What term means letters and numbers?

.....

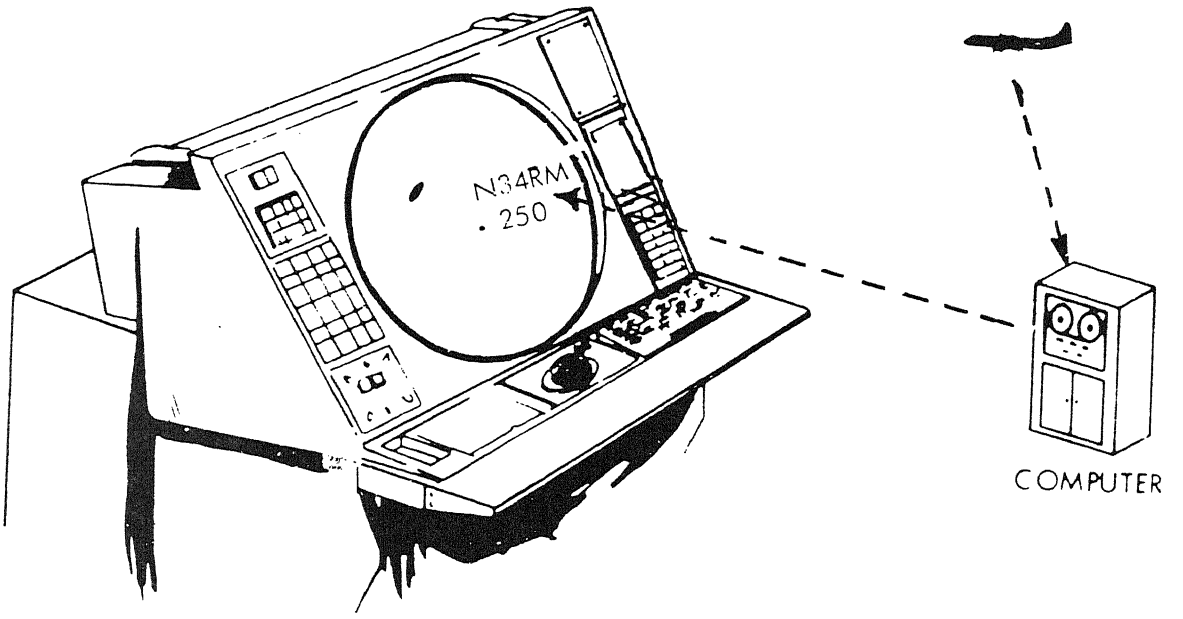
Alphanumerics

423

In the automatic handoff procedure what symbol appears on the radar scope to indicate the aircraft is approaching the preselected handoff point?

.....

The blinking word "HAND"



What is the altitude of the target in the above illustration?

.....

FL250

425

The new automation system will greatly enhance the safe accommodation of future air traffic workloads through the use of alphanumerics and the computerized printing and relaying of control information.

426

Up to this point you have received a broad overview of the National Airspace System, its components, and the duties of those who help make it work. You should be prepared to enter your next phase of training where you will learn in greater detail the skills needed to perform in your particular option. We are sure you will find serving the flying public a challenging and rewarding experience whether at a station, center, or tower. Again, welcome to the FAA.

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